

P 534

LONG DURATION EXPOSURE FACILITY POST-FLIGHT THERMAL ANALYSIS

William M. Berrios and Thomas R. Sampair

JANUARY 1992

Long Duration Exposure Facility (LDEF) - Thermal Analysis Report
Post-Flight Thermal Analysis Report

Volume 1
Volume 2
Volume 3



National Aeronautics and
Space Administration

Langley Research Center
Hampton, Virginia 23665-5225

LONG DURATION EXPOSURE FACILITY

POST-FLIGHT THERMAL ANALYSIS

PART 1

William M. Berrios

NASA/LaRC
MS 434
Hampton, Va. 23685-5225
Ph. (804) 864-7183

&

Thomas R. Sampair

Lockheed Engineering & Sciences Co.
MS 904
144 Research Dr.
Hampton, Va. 23686
Ph. (804) 788-9633

TABLE OF CONTENTS

PART 1

TITLE	PAGE
Summary	1
Introduction	2
LDEF Description	2
Mission History	2
Standard LDEF Identification	3
Thermal Control	3
Thermal Model	4
Thermal Analyzer Computer Programs	4
Thermal Model Description and Assumptions	5
Orbital Environment	6
Beta Angle and Attitude	6
Incident Heat Fluxes	6
Data	7
Flight Temperatures	7
Surface Coatings	8
Contamination	9
Results and Recommendations	9
References	11
Tables	
Table 1. LDEF Pre-Flight Tray/ Experiment Thermal Environment Design Limits	13
Table 2. LDEF Min/Max Row Flux Exposures	13
Table 3. LDEF Updated Thermal Environment for Post Flight Analysis	13
Table 4. LDEF Thermal Model Node Description	14
Table 5. Calculated Thermal Model Uncertainty	23
Table 6. Comparison of LDEF Temperatures Ranges	23
Table 7. Calculated Min/Max Orbital Temperatures	24
Table 8. Calculated Min/Max Daily Average Temperatures	31
Figures	
Fig. 1 LDEF in Free Flight	38
Fig. 2 LDEF Structure	39
Fig. 3 LDEF Peripheral Tray Assembly - 3 Inch Tray	40
Fig. 4 LDEF Peripheral Tray Assembly - 6 Inch Tray	41
Fig. 5 LDEF Peripheral Tray Assembly - 12 Inch Tray	42
Fig. 6 LDEF End "Center" Tray - 6 & 12 Inch Deep	43
Fig. 7 LDEF End "Corner" Tray - 6 & 12 Inch Deep	44
Fig. 8 Passive Heat Flow Around LDEF	45
Fig. 9 Tray - Structure Interface	46
Fig. 10 Comparison of Original Thermal Model to the LDEF Reduced Model	47
Fig. 11 Detail of Thermal Model Node Arrangement	48

TABLE OF CONTENTS

PART 1 (Continued)

TITLE	PAGE
Fig. 12 Thermal Model Intercostal Configuration	49
Fig. 13 Thermal Model Longeron Configuration	50
Fig. 14 LDEF Thermal Nodal Model	51
Fig. 15 LDEF Thermal Model, External Nodes - Earth End	52
Fig. 16 LDEF Thermal Model, Internal Nodes - Earth End	53
Fig. 17 LDEF Thermal Model, Ring "A" Nodes	54
Fig. 18 LDEF Thermal Model, Ring "B" Nodes	55
Fig. 19 LDEF Thermal Model, Ring "C" Nodes	56
Fig. 20 LDEF Thermal Model, Center Ring Nodes	57
Fig. 21 LDEF Thermal Model, Center Structure Nodes	58
Fig. 22 LDEF Thermal Model, Ring "D" Nodes	59
Fig. 23 LDEF Thermal Model, Ring "E" Nodes	60
Fig. 24 LDEF Thermal Model, Ring "F" Nodes	61
Fig. 25 LDEF Thermal Model, Internal Nodes - Space End	62
Fig. 26 LDEF Thermal Model, External Nodes - Space End	63
Fig. 27 LDEF Periphery External Nodalization	64
Fig. 28 LDEF End Tray/Structure Node Distribution	65
Fig. 29 Beta Angle Definition	66
Fig. 30 LDEF Beta Angle History; April 7, 1984 - January 12, 1990	67
Fig. 31 LDEF Beta Angle History; April 7, 1984 - May 13, 1985	68
Fig. 32 LDEF Beta Angle History; May 9, 1985 - June 14, 1986	69
Fig. 33 LDEF Beta Angle History; May 14, 1986 - May 28, 1987	70
Fig. 34 LDEF Beta Angle History; May 18, 1987 - May 18, 1988	71
Fig. 35 LDEF Beta Angle History; May 15, 1988 - May 15, 1989	72
Fig. 36 LDEF Beta Angle History; December 20, 1988 - January 12, 1990	73
Fig. 37 LDEF Altitude History; April 7, 1984 - January 12, 1990	74
Fig. 38 Location of THERM Hardware on the LDEF	75
Fig. 39 LDEF External Surface Coating Distribution	76
Fig. 40 Variable Anodic Thermal Control Coating Range	77
Fig. 41 THERM Reference 2 Vs LDEF Thermal Model Node 237	78
Fig. 42 THERM Center Ring Vs LDEF Thermal Model Node 217,218	79
Fig. 43 THERM Radiometer Vs LDEF Thermal Model Node 233	80
Fig. 44 THERM Damper Dome Vs LDEF Thermal Model Node 234	81
Fig. 45 THERM Row 6 Structure Vs LDEF Thermal Model Node 326	82
Fig. 46 THERM Earth End Vs LDEF Thermal Model Node 202	83
Fig. 47 THERM Space End Vs LDEF Thermal Model Node 209	84

Appendix A. ORBITAL INCIDENT HEAT FLUX

Appendix B. DAILY AVERAGE INCIDENT HEAT FLUX

Appendix C. BEGINNING OF MISSION TEMPERATURES

Appendix D. END OF MISSION TEMPERATURES

TABLE OF CONTENTS

PART 2*

Appendix E. ORBITAL TRANSIENT TEMPERATURES

Appendix F. TEMPERATURE DATA (THERM DATA)

*Published under separate cover

SUMMARY

The Long Duration Exposure Facility (LDEF) post-flight thermal model has been correlated to space flight temperature data recorded by the Thermal Measurements System (THERM), LDEF experiment P0003. The THERM experiment consisted of five copper-constantan thermocouples (T/C's), one suspended radiometer, two thermistor reference measurements, and an electronic data recording system. Total THERM system accuracy was designed to be within $\pm 10^{\circ}\text{F}$ for all measurements taken over a range from -30°F to 170°F . The actual measurements ranged from a low of 35°F to a maximum of 134°F for the T/C located on the longeron between row 6 and 7 at experiment bay B3. Flight temperatures, recorded at intervals of approximately 112 minutes for the first 390 days of LDEF's 2106 day mission were compared with predictions calculated by the thermal mathematical model (TMM). This math model was unverified prior to flight. The post-flight analysis has reduced the thermal model uncertainty from $\pm 40^{\circ}\text{F}$ to $\pm 18^{\circ}\text{F}$.

The LDEF was deployed on April 7, 1984 (12:26 EST) into a gravity gradient stabilized attitude at a $28\frac{1}{2}^{\circ}$ orbit inclination. Orbital beta angle (β) for the LDEF mission was $\pm 52^{\circ}$. LDEF altitude at deployment was 255NM and had fallen to 180 NM by the time of retrieval on January 12, 1990. Post-flight analysis indicated the LDEF had yawed 8° to 12° from row 9 towards row 8, thus biasing the leading edge (velocity vector) towards row 10 rather than row 9 (Fig. 1). Whether LDEF was yawed at deployment or sometime later in the mission is not known. For the post-flight calculation of temperatures, a new set of orbital detailed heat fluxes were calculated for the beta angle range of $\pm 52^{\circ}$ at 10° intervals for an average LDEF yaw angle of 10° . A composite daily averaged heat flux table for the first 390 days the LDEF mission was generated for all rows using the new set of orbital heat fluxes and the daily beta angle history obtained from ground tracking stations. The new set of daily averaged thermal fluxes were used for calculation of daily averaged temperatures for direct comparison to flight data.

The external surface thermal properties, absorptivity (α) and emissivity (ϵ) were measured during the deintegration operations of the LDEF at the Kennedy Space Center (KSC). All external structural surfaces, Earth and space end thermal panels, tray lips, and a limited number of experiments were measured at exposed and unexposed areas. The measured α/ϵ values combined with nominal material specifications were used to formulate the LDEF surface property conditions that existed at the beginning of the mission, end of the first year (390 days), and end of the mission (2106 days). Matching of the thermal model to flight data also enabled a better estimate of surface optical property degradation, bolted joint conductances, and correction of thermal radiation couplings from values used in the pre-flight model .

Results of the best fit thermal model are presented for all locations in the facility, including the 2, 3, and 4 equivalent node representations of the experiment trays. Results include temperatures for the beginning-of-mission (BOM), end-of-mission (EOM), and detailed orbital temperatures calculated for beta angles of -52° , 0° , and $+52^{\circ}$. Thermal orbital average heat flux data for both the BOM and the EOM as well as the per orbit heat flux from -52° to $+52^{\circ}$ in 10° increments have been included in the appendices A and B. Also included in this report is a comparison of measured temperatures vs. calculated values for locations where temperature sensors were located on the LDEF structure.

INTRODUCTION

The LDEF thermal math model description is presented in this report. The purpose of this report is to provide the LDEF principal investigators with a complete set of thermal boundary conditions (incidence heat flux and the temperature of the structure surrounding the tray) to use as input into their detailed thermal math models of their experiments.

The LDEF was developed by the Office of Aeronautics And Space Technology (OAST) and Langley Research Center (LaRC) to provide a shuttle-launched low cost accommodation for relatively simple experiments. These experiments would require long duration exposure to space environment (approx. 1 year). Many experiments are completely passive, depending entirely on post-flight laboratory investigations for the results.

LDEF DESCRIPTION

The LDEF is a reusable 12-sided cylindrical bolted assembly structure 14 ft. in diameter and 30 ft. in length (Fig. 2) with an empty weight of 8,500 lbs. 6061-T6 aluminum extrusions are the main components used for construction of the bolted and welded LDEF structure. The periphery will hold up to 72 equally sized rectangular (34 inches by 50 inches) trays and the end structures will hold another 14 smaller trays. Interchangeable LDEF trays of 3 inches, 6 inches, and 12 inches in depth (Figures 3 - 7) are mounted on the external surfaces for accommodating experiments. Each tray can accommodate one or more self-contained experiments of up to 180 pounds in weight. The flight configuration for this mission (Ref. 1) included 86 trays with a total of 57 experiments for a combined total weight of over 21,000 lbs.

Mission History

The LDEF was deployed on April 7, 1984 during the Challenger mission STS-41C. While the planned mission duration was for one year, the actual retrieval of the facility did not occur until January 12, 1990 with the Columbia flight STS-32. This resulted in a mission duration of approximately 5 $\frac{3}{4}$ years (2106 days). Active flight temperature data for the LDEF facility were recorded by the THERM experiment P0003 for the first 390 days (13 months) of the LDEF mission (Ref. 2).

Standard LDEF Identification

The thermal analysis uses the standard LDEF conventions for identification of facility locations (Fig. 1). The LDEF location identifying convention is as follows:

1. The 12-sided polygon is assigned incremental row numbers in a clockwise direction as observed from the Earth end. The keel fitting is located at the center ring row 6, thus it is located at the bottom of the clock position. While in orbit, Row 3 is the trailing edge of the facility and row 9 is referred as the leading edge of the facility. Once LDEF is in free flight, row 6 points towards the south pole and row 12 points towards the north pole.
2. The 6 peripheral experiment bays are identified alphabetically from A to F. The "A" bay is adjacent to the Earth and bay "F" is adjacent to the space end as shown Figure 1.
3. The Earth facing end has been assigned a G identifier
(i.e. G-2, G-4, G-6).
4. The space facing end has been assigned an H identifier
(i.e. H-1, H-3, H5).
5. Structural components are identified relative to adjacent bays, examples are:
 - a. Intercostal AB1 (Between Bays A and B, Row 1)
 - b. Longeron ABC1-2 (Between Bays A, B, and C, Rows 1-2)
 - c. Center Ring CD1 (Between Bays C and D, Row 1)

Thermal Control

The thermal control of the LDEF was totally passive by design, thus relying on internal radiation heat transfer, heat conduction paths, and the external surface coatings (α/ϵ) for facility temperature control (Fig. 8). All interior structure and tray surfaces were coated with Chemglaze Z306 high emissivity black paint ($\epsilon=0.90$) to minimize any circumferential thermal gradients and to maximize the heat transfer across the facility. In addition, radiation blockage was decreased by minimizing the number of structural components inside the spacecraft. To minimize conduction heat transfer from the structure, the experiment trays were attached to the LDEF structure by eight 2"×5" aluminum clamps along the tray perimeter (Fig. 9). The tray mounting scheme minimizes the contact conduction area through which heat can be transferred between the facility and the experiment trays.

The LDEF experiment and tray thermal boundary condition design limits are shown in Table 1. The LDEF internal average temperature was required to be maintained between 10°F and 120°F for the flight. This was accomplished by careful selection and placement of the experiment trays with their wide range of thermal control coatings. The various tray types were uniformly

distributed over the surface of the facility to equalize the thermal properties. The distribution of the exterior surface coatings was such that over 50% of the thermal control surface area was provided by the chromic anodized coatings on the facility's aluminum structure, tray flanges, and debris panels (Space Debris Experiment S0001, ~ 24 trays, $\alpha/\epsilon=0.32/0.16$). The external surface α/ϵ for each of the tray flanges and debris panels were left undefined until the experiment selection was complete. Once the tray thermal control coatings were known, the surface α/ϵ for the tray lips and debris panels were selected to maintain the facility temperature within the thermal design requirements.

The LDEF structure and all experiment trays were closed to prevent solar heat flux from entering the interior. Venting holes were distributed uniformly around the facility, this venting area was approximately 0.15% of total external surface area. The thermal model accounts for the venting holes by radiatively coupling the LDEF interior to the space environment.

THERMAL MODEL

Thermal Analyzer Computer Programs

The programs used for the calculation of the LDEF incident heat fluxes and temperatures were the Thermal Radiation Analysis System II (TRASYS II, Ref 3) and the System Improved Numerical Differencing Analyzer (SINDA, Ref 4). SINDA calculates temperatures by solving lumped parameter representations of physical problems governed by diffusion-type equations. Parameters include thermal mass, surface (α/ϵ) properties and thermal conductance and radiation couplings. All linear conductors for the structure and experiment trays were calculated by hand. Over 20,000 computer generated internal radiation couplings were reduced to a manageable size by lumping the very small values into an internal dummy node (233) and then adjusting the remaining values to assure that the sum of the view factors is equal to one for each internal surface. Other detailed radiation couplings between isolated surfaces were generated by hand. The TRASYS II program was used to calculate the solar, albedo, and infrared incidence radiation heat fluxes.

Thermal Model Description and Assumptions

The original thermal model (Ref. 5) was created prior to the LDEF deployment and was restricted by program and computer capabilities to less than 300 nodes. The post-flight analysis has grown to 327 nodes in order to improve the mathematical model and facilitate comparison to the THERM experiment temperatures. Most experiment trays were described by a 2 node lumped parameter model with one external node representing the experiment and one internal node for the tray. The external facing tray mounting flanges were included in the internal node and therefore this node was connected directly to the space environment. The more complicated experiments were described by 3 and 4 node models with more than one external surface node.

The two, three, and four node experiment models were created by taking a detailed thermal model for each experiment which could be up to 80 nodes in size and then reducing this detailed model into a two,three, or four node representation with a comparable energy balance and equivalent α/ϵ surface properties (Fig. 10, Ref. 6). Figure 11 shows how the experiment tray nodes are arranged in relation to the structure nodes in the thermal model.

The intercostal and longerons were grouped into 24 longeron nodes. The intercostals were divided into two halves, with each half assigned to the adjacent longeron. Although the intercostal is bolted to the longeron, they saw a uniform environment and were considered isothermal. The center ring was divided into 12 equal parts with each part attached to adjacent longeron nodes. Separate nodes were used for the end of the longerons to take into account the temperature differences that exists between the ends and sides of the LDEF structure. Tray/structure thermal interface and thermal geometry representations are presented in Figures 12 and 13.

Bolted joints were assumed to have a conduction area equal to 25% of the total joint surface contact area. A thermal conductance (K) value of 7.4 Btu/hr-in. $^{-2}$ F was used for the 6061-T6 aluminum structure. View factor values of 0.12, 0.76, and 1.0 were used to couple all earth end, side row, and space end experiments to space. The Earth was coupled to LDEF with view factors of 0.88 for the earth end and 0.24 for the side row experiments. The space end experiments were not coupled to the Earth. The temperature values presented in this report for the tray/experiment (T/E) equivalent nodes only represents an average for that tray location. To obtain more accurate experiment component temperatures the Principal Investigators must rely on their own detailed thermal model using the LDEF interior average temperature (dummy node 233) and temperature of the structure surrounding the experiment tray from the LDEF thermal model as the boundary conditions for their thermal models.

A complete nodal breakdown of the LDEF thermal model is presented in Figures 14-28. The nodes are laid out by rings (A - F) with row 12 at the top and rows 1 - 11 going in the clockwise direction around the ring. Trays located on rings A and F are surrounded by four structure nodes while trays located on rings B and E have only two structure nodes. Trays on rings C and D are surrounded by three nodes the same two nodes as B and E and a center ring node.

ORBITAL ENVIRONMENT

Beta Angle and Attitude

The LDEF was deployed into a gravity gradient stabilized attitude at an orbit inclination of 28½° to the equatorial plane. The gravity gradient orbit allows the LDEF to maintain a specific leading (row 9) and trailing (row 3) edge and also allows the experiments in rows 11, 12, 1 to the north or rows 4,5,6 to the south, face the sun or space for extended periods of time. The minimum/maximum orbital beta angle (β) for the LDEF mission ranged from +52° to -52°. The diagram shown in Figure 29 defines the β as the angle between the plane of the orbit and the sun illumination vector.

Due to the symmetry of the spacecraft, the north (row 12) and south (row 6) sides experienced the maximum worst case daytime sun exposure at the extremes of the β angle range. Row 6 experiences maximum incidence heat flux at a β of -52° , while row 12 receives the maximum at a β of $+52^\circ$. Rows 3 and 9 experience a maximum flux at approximately β equal to $\pm 10^\circ$ and the minimum flux at β equal to $+52^\circ$ or -52° . Shown in Table 2 are the LDEF row numbers and the β angle at which they experience their maximum and minimum exposure to the solar incidence flux. Further inspection of the LDEF after it was returned to Earth revealed that the leading edge velocity vector was yawed approximately $8^\circ - 12^\circ$ towards row 10.

Orbital ground tracking data was obtained from the Johnson Space Center for the complete LDEF mission. The beta angle history from April 7 1984 to January 20 1990 for the LDEF is shown in Figure 30 with the individual years given in Figures 31 - 36. The beta angles used in the thermal analysis for the first year are shown in Figure 31 and for the EOM in Figure 36. LDEF was placed in orbit at a perigee altitude of 255 NM and had fallen to 180 NM when the facility was retrieved on January 12, 1990. A complete altitude history for the LDEF mission is presented on Figure 37.

Incident Heat Fluxes

The heat flux calculations for the facility were updated with actual solar constant values as measured by earth orbiting observatories (Ref. 7, 8). The average solar constant, planetary infrared, and albedo values used in this analysis are presented in Table 3. The updated incident thermal fluxes were calculated using the TRASYS II computer code and entered as input to the SINDA thermal analyzer. The incident fluxes were converted into absorbed fluxes when the SINDA program was executed. Transient fluxes were calculated for an orbit beta angle range between $+52^\circ$ and -52° in 10° increments. Incident heat flux calculations were based on a yaw of 10° for the LDEF facility. All heat fluxes presented in this report are the row incidence flux which means the form factor for each row are built into the flux for that row. The principal investigator need only to account for surface α/ϵ properties when using these fluxes in their thermal analyses.

Appendix A contains plots and tables of the transient heat flux data for each 10° increment calculated. From the range of transient fluxes calculated above, two composite daily average heat flux tables were developed for the first and last years of the mission using the beta angles shown in Figures 31 and 36. Thus input fluxes for both steady-state and transient thermal models were generated. Given in Appendix B are the plots and tables for the first year daily average fluxes versus mission elapsed time (MET) for each row on the LDEF. The steady-state model is used to predict the daily average temperature for the spacecraft over the first and last years of the mission while the transient model is used to predict orbital day/night temperature cycles. The cases analyzed with the transient and daily averaged thermal fluxes are presented in the Appendices C - E and include:

- BOM daily averaged temperatures (Appendix C) for 13 months (390 days), including seasonal and daily change of orbital beta angles. Fluxes were calculated following orbital ground tracking data (Fig. 31) during the first year of the LDEF mission.

- EOM daily averaged temperatures (Appendix D) for 13 months (390 days), including seasonal and daily change of orbital β 's. Fluxes were calculated following orbital ground tracking data (Fig. 36) during the last year of the LDEF mission.
- Day/night temperature cycling for orbit β equal to $+52^\circ$, -52° , and 0° (Appendix E).

DATA

Flight Temperatures

The flight temperature data for the LDEF were obtained from the THERM system experiment P0003 (Ref. 2). The THERM experiment consisted of five copper-constantan thermocouples (T/C), one suspended radiometer, two thermistor reference measurements, an electronic scanning system, one 7.5-V battery, and an interface harness with the Low Temperature Heat Pipe Experiment Package (HEPP). The THERM data was recorded on dedicated channels of the shared experiment power and data system (EPDS) tape recorder in the HEPP experiment. The design objectives for the THERM experiment were as follows:

- To significantly reduce the uncertainty of $\pm 40^\circ$ for the LDEF structural temperature values calculated with the pre-flight thermal model.
- Provide an approximate indication of the LDEF attitude in flight.

The THERM hardware was located at selected areas of the LDEF interior in order to maximize the thermal environment characterization with a limited number of measurements (Fig. 38). Two thermistors measured the THERM electronic junction temperatures and were used for system calibration (thermistors #2 and #8). A measurement of the LDEF interior temperature average was made by suspending a radiometer with a T/C at the center of the LDEF interior (T/C #4). The radiometer was radiatively coupled to all of the interior surfaces, thus providing an average temperature of all interior surfaces. T/C #1 was located on the center structure to provide a backup temperature value to the radiometer. The center structure is a massive aluminum part that carries the main load of the spacecraft during the deployment and retrieval operations and is radiatively coupled to most of the internal surfaces. T/C #3 was located on top of the magnetic viscous damper thermal radiation shield. This T/C was thermally insulated from the dome and was used to measure the thermal environment around the viscous damper. But because T/C was mounted between two mylar disks and then taped to the damper dome, the T/C was thermally isolated from the environment it was trying to measure, therefore authors have very low confidence in the data taken at this location. Furthermore the temperature measurements at this location showed the largest difference from the calculated values.

The structural temperatures were characterized by the remaining three T/C's. T/C #5 was mounted on a structural member located on row 6 of the facility. This area was parallel to the orbit plane and experienced incident thermal flux environments that varied widely, depending on

the orbital β . For β 's from 0° to $+52^\circ$ this side of the facility did not see direct solar incident thermal flux (albedo only). For negative β 's from 0° to -52° , the solar flux occurs for the full orbital daylight period with the $-52^\circ \beta$ being the maximum solar flux exposure for this row. This T/C also helped validate LDEF's in-flight attitude. T/C #6 was located on the space end structure near row 12 to provide space end mounted experiments with representative boundary temperatures. The space end location had the maximum radiative coupling to space and no incident planetary or albedo thermal fluxes. The last temperature measurement, T/C #7, was located on the earth end structure near row six in order to measure the night/day (N/D) temperature cycling on that end with maximum radiative coupling to the planet.

The raw and daily average flight data for the eight thermocouples are plotted and tabulated versus mission elapsed time (MET) in Appendix F. Flight temperatures were recorded at eight internal locations for the first 390 days of the mission at intervals of approximately every 112 minutes. Total system accuracy was designed to be within $\pm 10^\circ\text{F}$ for all measurements over the range -30° to $+170^\circ\text{F}$. The actual recorded temperatures for all seven locations ranged from a minimum of 35°F to a maximum of 134°F at the longeron 6-7 location (T/C #5). The recorded temperatures were used to verify the pre-flight thermal model calculated temperatures and to calibrate the post-flight thermal model temperature predictions.

Surface Coatings

Upon return of the LDEF to the Spacecraft Assembly and Encapsulation Facility 2 (SAEF 2) at the Kennedy Space Center (KSC), Florida, the external structural surface thermal properties were measured after removal of the experiment trays (Ref. 9). Surface thermal properties on all longerons, intercostals, and tray lips were measured. Several tray surfaces and a limited quantity of experiment surfaces were also measured. Surfaces measured included aluminum (bare, clear, and black chrome anodized), silvered Teflon films, and paints. As seen in the surface distribution chart (Fig. 39), the largest external surface material on the LDEF was aluminum with a range of anodized surface finishes. The anodized aluminum was chosen as the main thermal control coating for the LDEF facility because of the ease in which the α/ϵ thermo-optical properties could be varied by the variable chromic anodizing process (Fig. 40) developed by R. J. Duckett and C.S. Gilliland of the Langley Research Center (Ref. 10,11).

For correlation of space exposure effects, surfaces that were blocked from direct space exposure by other hardware (i.e. tray lips & clamps) were measured and compared to exposed surfaces. A large sampling of the anodized aluminum was obtained by direct measurement for all of the LDEF periphery. Unexposed surfaces showed α/ϵ values close to the nominal new surfaces, while the exposed surfaces showed several degrees of degradation depending on their location on the LDEF. The delta between the exposed and unexposed surface coatings were used to estimate the coating degradation. These deltas were applied to the nominal (new) surface-optical properties at the beginning of the mission to approximate the degradation that took place during the first year of flight. The direct measured surface α/ϵ values were also used for calculating the EOM in-flight LDEF temperatures. Table 4 gives the surface optical properties used for the first and last years of the LDEF mission temperature analysis.

Contamination

Values obtained from the measurement of the thermo-optical properties for the LDEF external surfaces indicated the presence of contamination on the thermal control coatings. The effects of the contaminant layer on the LDEF clear anodized aluminum surfaces appeared stronger at locations opposite to the LDEF velocity vector, while the surfaces on the velocity vector showed the least amount of degradation from the nominal thermo-optical properties. The degraded α/ϵ values used for the surface coatings were those measured during the LDEF disassembly. As the bulk of the outgassing contamination occurred during the beginning of the LDEF mission, it was assumed that the leading edge (Row 9) coatings had the same contamination effects as the trailing edge (Row 3). This assessment is consistent with results from the experiment S0010. The experiment S0010 included an Experiment Exposure Control Canister (EECC), located on the leading edge of the LDEF. The EECC opened shortly after deployment and closed after 10 months in orbit as programmed. The opening of the EECC by the principal investigator showed the hardware inside the canister to have contamination similar to that of the trailing edge of the facility, although the post-flight leading edge exposed surfaces' α/ϵ showed less effects from contamination than those on the trailing edge. The α/ϵ difference between the leading and trailing edge can be attributed to the cleaning effect occurring on the leading edge surfaces exposed to atomic oxygen (AO) impinging flux. The amount of AO rises sharply at lower orbit altitudes and also with increased solar activity such as experienced by the LDEF during the last year of the mission. The post-flight end of mission thermal analysis takes into account the effects of this varying contamination on the external surfaces by using the measured α/ϵ values taken directly from the facility at disassembly.

RESULTS and RECOMMENDATIONS

Shown in Figures 41 - 47 are the comparisons of THERM system temperature sensors to the post-flight thermal model. The flight data shown in each plot are the daily average temperatures for that location. Data scans were taken 12 - 13 times a day and the data for each day were averaged into one temperature for that day. This allowed a direct comparison to be made against the steady-state thermal model temperature calculations.

A direct comparison of calculated versus measured values was done for each sensor location. The locations with the smallest model error were at the center ring, reference thermistor, and the space end which all had a standard deviation (3σ) of ± 9 °F. The earth end and the row 6 longeron had the next lowest deviation of ± 12 °F. The radiometer had the second largest 3σ T/C error of ± 15 °F. A maximum uncertainty between the calculated and measured values of ± 18 °F was obtained at the damper dome location. The curves also show the maximum calculated temperature uncertainties occurred toward the end of the thermal analysis. The LDEF TMM assumed fully degraded α/ϵ values by the end of the 390 days of the THERM data period. It is likely that the fully degraded surface property values were achieved after the THERM ceased operation, thus the diversion between the calculated and measured temperatures as seen at the end of the data period on all data figures. As the contamination effects were highly variable during the course of the first part of the LDEF mission, it was difficult to extrapolate the degradation curve for the affected coatings. A longer operation of the THERM system into the second year of the LDEF mission would have enabled an improved characterization of the contamination effects and a better agreement between the calculated and measured temperatures towards the end of the data period. The 3σ uncertainties (Table 5) are no greater than ± 18 °F for any of the THERM temperature

sensor locations, thus achieving the desired reduction of calculated temperature uncertainties to under $\pm 20^{\circ}\text{F}$. Given in Table 6 are the temperature range comparisons between the design limits, measured temperatures, and the post-flight calculated temperatures for the T/C locations.

The maximum and minimum per orbit temperatures achieved for the extreme beta angle cases $+52^{\circ}$, -52° , and 0° along with the nodal temperature limits indexed by node number are summarized in Table 7. Table 8 summarizes the maximum and minimum daily average temperature results obtained for the first and last 390 days of the LDEF mission. Appendix A contains the orbital thermal heat flux data for each row from -52° to $+52^{\circ}$ in 10° increments. The daily average heat flux for the first year of flight versus MET for each row are given in Appendix B. Appendices C and D contain the daily average temperatures versus MET for the first and last 390 days. Given in Appendix E are the per orbit transient temperature profiles versus orbit time for the extreme beta angle cases of $\pm 52^{\circ}$ and 0° .

T/E nodes are 2, 3, or 4 node lumped parameter representations of detailed experiment thermal models of up to 80 nodes, describing in some cases very complex hardware configurations. Listed temperatures for the T/E nodes should not be construed as actual component temperatures. In order to obtain T/E component temperatures, the detailed thermal models have to be updated with the temperature and incidence heat flux boundary conditions presented in this report.

REFERENCES

1. Long Duration Exposure Facility (LDEF) Mission 1 Experiments, NASA SP-473, Langley Research Center 1984.
2. Green, R. F.: LDEF Measurements System (THERM); NASA SP-473, The Long Duration Exposure Facility (LDEF); Mission 1 Experiments, pp 78, 79.
3. Thermal Radiation Analysis System II (TRASYS II); User's Manual, NAS 9-15832, June 1983.
4. Systems Improved Numerical Differencing Analyzer (SINDA);User's Manual, March 1983, NAS 9-15800.
5. Berrios W. M., Green R. F.: LDEF Thermal Model Description, Revision C: LDEF 840-008C: Revision C: NASA/LaRC, March 1983.
6. Greene, R.F.: Thermal Design and Experiment Thermal Integration of the Long Duration Exposure Facility, AIAA-82-08029, June 1982.
7. Hickey, J.R.,Alton B. M.: Status of Solar Measurements and Data Reduction for ERB Nimbus 7, The Eppley Laboratory Inc., Newport, RI 02840, HC A414/mf A01,pp 43-58.

8. Smith, L. D., Vonder Haar T H., Randel D. L.: Interannual Variability Study of the Earth Radiation Budget from Nimbus 7 Monthly Data, Conference on Atmospheric Radiation, Sixth, Williamsburg, Va, May 13-16, 1986, Extended Abstracts, pp 211-214.
9. Sampair, T. R.; Berrios, W. M.: Effects of Low Earth Orbit Environment on the Long Duration Exposure Facility Thermal Control Coatings, LDEF 69 Months in Space, First Post-Retrieval Symposium, June 2-8, 1991, NASA CP-3134.
10. Duckett R. J., Gilliland C. S.: Variable Anodic Thermal Control Coating on Aluminum, AIAA 18th Thermophysics Conference , June 1-3, 1983, AIAA-83-1492.
11. Variable Anodic Thermal Control Coatings, U.S. Patent #4,397,716, August 9, 1983.

This page intentionally left blank

Table 1. LDEF Pre-Flight Tray/Experiment Thermal Environment Design Limits.

Description	Minimum °F	Maximum °F
Structure Temperature	-10	150
Internal Average Temperature	10	120
Space End Structure Temperature	30	135
Earth End Structure Temperature	10	135
Internal Emissivity	.90	.90
Solar Radiation: 408 - 451 Btu/Hr-ft ²		
Albedo: 30-45 %		
Earth Radiation: 72.9 - 77.4 Btu/Hr-ft ²		
Space Sink Temperature: 0°R		

Table 2. LDEF Row Min/Max Solar Incidence Flux Exposures.

β	Min Orbital Sun Exposure	Max Orbital Sun Exposure
+52°	4,5,6,7,8,9,EE,SE	1,2,10,11,12
-52°	1,2,3,10,11,12,EE,S	4,5,6,7,8
0°		EE,SE
10°		3
-10°		9

EE - Earth end, SE - space end

Table 3. LDEF Updated Thermal Environment for Post-Flight Analysis.

Solar Radiation: 434 Btu/Hr-ft ²
Albedo: 31 %
Earth Radiation: 77 Btu/Hr-ft ²
Space Sink Temperature: 0°R

Table 4. LDEF Thermal Model Node Description.

Node	Ext Area Sq In	Description	Location	Material		Nominal Surf		End First Year		EOA Surf		
				α_e	α_c	ϵ_e	ϵ_c	α/t	α	ϵ	ϵ/t	
1	312.0	3" Tray-A0175	A1	6061-T6 AL	.329	.250	.132	.363	.224	.162	.367	.215
2	380.0	12" Tray-A0178	A2	6061-T6 AL	.322	.160	.201	.356	.134	.266	.356	.157
3	360.0	12" Tray-A0187	A3	6061-T6 AL	.322	.160	.201	.356	.134	.266	.360	.158
4	380.0	12" Tray-A0178	A4	6061-T6 AL	.322	.160	.201	.356	.134	.266	.355	.144
5	370.0	3" Tray-S0001	A5	6061-T6 AL	.329	.250	.132	.363	.224	.162	.383	.216
6	370.0	3" Tray-S0001	A6	6061-T6 AL	.329	.250	.132	.363	.224	.162	.365	.118
7	312.0	3" Tray-A0175	A7	6061-T6 AL	.329	.250	.132	.363	.224	.162	.335	.09
8	312.0	3" Tray-A0171	A8	6061-T6 AL	.329	.250	.132	.363	.224	.162	.335	.219
9	360.0	12" Tray-S0069	A9	6061-T6 AL	.322	.160	.201	.356	.134	.266	.356	.228
10	380.0	12" Tray-A0178	A10	6061-T6 AL	.322	.160	.201	.356	.134	.266	.356	.138
11	312.0	3" Tray-A0187	A11	6061-T6 AL	.329	.250	.132	.363	.224	.162	.325	.147
12	370.0	3" Tray-S0001	A12	6061-T6 AL	.329	.250	.132	.363	.224	.162	.332	.147
13	370.0	6" Tray-S0001	B1	6061-T6 AL	.329	.250	.132	.363	.224	.162	.387	.220
14	370.0	3" Tray-S0001	B2	6061-T6 AL	.329	.250	.132	.363	.224	.162	.344	.220
15	360.0	12" Tray-A0138	B3	6061-T6 AL	.322	.160	.201	.356	.134	.266	.404	.238
16	311.0	3" Tray-A0054	B4	6061-T6 AL	.329	.250	.132	.363	.224	.162	.332	.215
17	380.0	12" Tray-A0178	B5	6061-T6 AL	.322	.160	.201	.356	.134	.266	.387	.220
18	370.0	3" Tray-S0001	B6	6061-T6 AL	.329	.250	.132	.363	.224	.162	.362	.149
19	380.0	12" Tray-A0178	B7	6061-T6 AL	.322	.160	.201	.356	.134	.266	.388	.183
20	312.0	3" Tray-S0001:A0056:A0147	B8	6061-T6 AL	.329	.250	.132	.363	.224	.162	.324	.127
21	360.0	3" Tray-S0010:A0134	B9	6061-T6 AL	.329	.250	.132	.363	.224	.162	.397	.233
22	380.0	12" Tray-S1005	B10	6061-T6 AL	.322	.160	.201	.356	.134	.266	.362	.149
23	370.0	6" Tray-S0001	B11	6061-T6 AL	.329	.250	.132	.363	.224	.162	.354	.234
24	360.0	3" Tray-A0201	B12	6061-T6 AL	.327	.172	.190	.361	.146	.248	.344	.235
25	579.0	6" Tray--GRAPPLE--	C1	6061-T6 AL	.329	.250	.132	.363	.224	.162	.354	.150
26	360.0	6" Tray-A0015:A0187:M0006	C2	6061-T6 AL	.327	.172	.190	.361	.146	.248	.356	.138
27	311.0	3" Tray-A0023:A0034:A0114:A0201	C3	6061-T6 AL	.329	.172	.191	.363	.146	.249	.354	.150
28	370.0	3" Tray-S0001	C4	6061-T6 AL	.329	.250	.132	.363	.224	.162	.370	.149
29	380.0	12" Tray-A0178	C5	6061-T6 AL	.322	.160	.201	.356	.134	.266	.383	.248
30	380.0	12" Tray-A0178	C6	6061-T6 AL	.329	.160	.206	.363	.134	.272	.353	.136
31	370.0	3" Tray-S0001	C7	6061-T6 AL	.329	.250	.132	.363	.224	.162	.359	.218
32	380.0	12" Tray-A0178	C8	6061-T6 AL	.322	.160	.201	.356	.134	.266	.360	.165
33	311.0	3" Tray-A0023:A0034:A0114:A0201	C9	6061-T6 AL	.329	.172	.191	.363	.146	.249	.346	.129
34	579.0	6" Tray--GRAPPLE--	C10	6061-T6 AL	.327	.172	.190	.361	.146	.248	.364	.140
35	380.0	12" Tray-A0178	C11	6061-T6 AL	.322	.160	.201	.356	.134	.266	.367	.112
36	469.0	3" Tray-S0109	C12	6061-T6 AL	.327	.250	.131	.361	.224	.161	.354	.144
37	380.0	12" Tray-A0178	D1	6061-T6 AL	.322	.160	.201	.356	.134	.266	.345	.155

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	Nominal Surf			EoM Surf		
					α	ϵ	α/ϵ	α	ϵ	α/ϵ
38	311.0	6" Tray-A0172;A0189;S001	D2	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
39	312.0	3" Tray-M0002;M0003	D3	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
40	360.0	3" Tray-M0003	D4	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
41	380.0	12" Tray-A0178	D5	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
42	312.0	3" Tray-A0201;S0001	D6	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
43	380.0	12" Tray-A0178	D7	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
44	360.0	3" Tray-M0003	D8	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
45	312.0	3" Tray-M0002;M0003	D9	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
46	311.0	6" Tray-A0054	D10	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
47	380.0	12" Tray-A0178	D11	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
48	311.0	3" Tray-A0019;A0023;A0180	D12	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
49	370.0	6" Tray-S0001	E1	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
50	380.0	12" Tray-A0178	E2	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
51	340.0	3" Tray-S1002	E3	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
52	370.0	3" Tray-S0001	E4	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
53	576.0	3" Tray-A0044;A0135;S0050	E5	6061-T6 AL	.329	.250	1.32	.363	.146	2.49
54	311.0	3" Tray-A0023;M0002;S1003;S1006	E6	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
55	370.0	3" Tray-S0001	E7	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
56	312.0	3" Tray-A0187	E8	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
57	360.0	12" Tray-S0014	E9	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
58	380.0	12" Tray-A0178	E10	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
59	370.0	6" Tray-S0001	E11	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
60	576.0	12" Tray-A0038	E12	6061-T6 AL	.235	.800	0.29	.317	.892	0.36
61	370.0	3" Tray-S0001	F1	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
62	360.0	3" Tray-P0004	F2	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
63	370.0	3" Tray-S0001	F3	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
64	380.0	12" Tray-A0178	F4	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
65	370.0	3" Tray-S0001	F5	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
66	576.0	12" Tray-A0038	F6	6061-T6 AL	.235	.800	0.29	.350	.762	0.46
67	370.0	3" Tray-S0001	F7	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
68	470.0	3" Tray-M0004	F8	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
69	340.0	3" Tray-S0076	F9	6061-T6 AL	.329	.172	1.91	.363	.146	2.49
70	370.0	3" Tray-S0001	F10	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
71	370.0	3" Tray-S0001	F11	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
72	360.0	12" Tray-S1001	F12	6061-T6 AL	.322	.160	2.01	.356	.134	2.66
73	360.0	3" Tray-S0001	G8	6061-T6 AL	.329	.250	1.32	.363	.224	1.62
74	246.0	12" Tray-A0139A	G6	6061-T6 AL	.322	.160	2.01	.356	.134	2.66

Table 4. LDEF Thermal Model Node Description. (Cont.)

Ext Area Node	Sq In	Description	Location	Material	α	ε	α/ε	α	ε	α/ε	α	ε	α/ε
75	360.0	6" Tray-S0001	G4	6061-T6 AL	.329	.250	1.32	.363	.224	1.62	.356	.248	1.44
76	0.0	---Blind Cover Plate---	G9	6061-T6 AL	.000	.000	.000	.000	.000	0.00	.000	.000	0.00
77	0.0	---Blind Cover Plate---	G CT	6061-T6 AL	.000	.000	.000	.000	.000	0.00	.000	.000	0.00
78	226.1	---Blind Cover Plate---	G3	6061-T6 AL	.000	.000	.000	.000	.000	0.00	.000	.000	0.00
79	226.0	3" Tray-A0201	G10	6061-T6 AL	.329	.250	1.32	.363	.224	1.62	.341	.224	1.52
80	246.0	3" Tray-A0056:A0147:A0172:M0002:-	G12	6061-T6 AL	.329	.250	1.32	.363	.224	1.62	.341	.232	1.47
81	370.0	3" Tray-A0015	G2	6061-T6 AL	.327	.172	1.90	.361	.146	2.48	.351	.154	2.28
82	248.0	3" Tray-A0023:A0201:-	H11	6061-T6 AL	.329	.172	1.91	.363	.146	2.49	.394	.166	2.37
83	234.0	6" Tray-A0133	H7	6061-T6 AL	.327	.172	1.90	.361	.146	2.48	.363	.153	2.37
84	246.0	12" Tray-A0038	H6	6061-T6 AL	.280	.800	0.35	.418	.760	0.55	.418	.760	0.55
85	360.0	3" Tray-S0001	H5	6061-T6 AL	.327	.250	1.31	.361	.224	1.61	.401	.238	1.68
86	246.0	12" Tray-A0038	H9	6061-T6 AL	.280	.800	0.35	.430	.790	0.54	.430	.790	0.54
87	0.0	---BLIND COVER PLATE---	H CT	6061-T6 AL	.000	.000	.000	.000	.000	0.00	.000	.000	0.00
88	246.0	6" TRAY-M0001	H3	6061-T6 AL	.327	.172	1.90	.361	.146	2.48	.371	.163	2.28
89	246.0	6" TRAY-M0001	H12	6061-T6 AL	.327	.172	1.90	.361	.146	2.48	.348	.170	2.05
90	246.0	12" TRAY-S1001	H1	6061-T6 AL	.365	.180	2.03	.000	.000	0.00	.392	.132	2.97
91	1511.0	Graph/Poly,Graph/Ep Mech Prop	A1	NA	.930	.930	1.00	.940	.880	1.07	.940	.880	1.07
92	1828.0	CRE-Cosmic Ray Exp	A2	NA	.080	.800	0.10	.085	.800	0.11	.085	.800	0.11
93	1861.0	CME-Chem. of UMeteoroids Exp	A3	NA	.110	.160	0.69	.150	.150	1.00	.150	.150	1.00
94	1828.0	CRE-Cosmic Ray Exp	A4	NA	.080	.800	0.10	.085	.800	0.11	.085	.800	0.11
95	1813.0	SDE-Space Debris Exp	A5	NA	.270	.140	1.93	.320	.140	2.29	.320	.140	2.29
96	1813.0	SDE-Space Debris Exp	A6	6061-T6 AL	.250	.140	1.79	.300	.140	2.14	.300	.140	2.14
97	1545.0	Graph/Poly,Graph/Ep Mech Prop	A7	6061-T6 AL	.700	.900	0.78	.700	.900	0.78	.700	.900	0.78
98	1853.0	SAM-Solar Array Materials, Passive	A8	NA	.520	.550	0.95	.520	.500	1.04	.520	.500	1.04
99	1828.0	TCSE-Thermal Control Surf Exp	A9	NA	.100	.690	0.14	.200	.670	0.30	.200	.670	0.30
100	1828.0	CRE-Cosmic Ray Exp	A10	NA	.080	.800	0.10	.085	.800	0.11	.085	.800	0.11
101	1856.0	CME-Chem. of UMeteoroids Exp	A11	NA	.200	.040	5.00	.220	.040	5.50	.220	.040	5.50
102	1813.0	SDE-Space Debris Exp	A12	6061-T6 AL	.250	.140	1.79	.300	.130	2.31	.300	.130	2.31
103	1813.0	SDE-Space Debris Exp	B1	6061-T6 AL	.300	.130	2.31	.350	.130	2.69	.350	.130	2.69
104	1813.0	SDE-Space Debris Exp	B2	6061-T6 AL	.300	.130	2.31	.350	.130	2.69	.350	.130	2.69
105	1209.0	FRECOPA FRENCH	B3	Aluminum	.400	.150	2.67	.440	.140	3.14	.440	.140	3.14
106	1855.0	Space Plasma H-Voltage Drain Exp	B4	NA	.485	.780	0.62	.515	.770	0.67	.515	.770	0.67
107	1828.0	CRE-Cosmic Ray Exp	B5	NA	.080	.800	0.10	.085	.800	0.11	.085	.800	0.11
108	1813.0	SDE-Space Debris Exp	B6	6061-T6 AL	.300	.150	2.00	.350	.140	2.50	.350	.140	2.50
109	1828.0	CRE-Cosmic Ray Exp	B7	NA	.080	.800	0.10	.085	.800	0.11	.085	.800	0.11
110	1856.0	S0001:A0056:A0147	B8	NA	.370	.270	1.37	.420	.260	1.62	.420	.260	1.62
111	1827.0	Exposure of S/C Coatings: A0134	B9	NA	.470	.630	0.75	.520	.620	0.84	.520	.620	0.84

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	Nominal Surf			E0M Surf		
					α	ε	α/ε	α	ε	α/ε
112	1829.0	Transverse Flat Heat Pipes	B10	NA	.200	.850	.24	.240	.840	.29
113	1813.0	SDE-Space Debris Exp	B11	6061-T6 AL	.300	.140	.214	.350	.140	.240
114	1827.0	IDE-Interplanetary Dust Exp	B12	NA	.250	.391	.64	.290	.073	.350
115	1211.0	--GRAPPLE---	C1	NA	.414	.330	.125	.444	.380	.117
116	489.0	A0015:A0187:M0006	C2	NA	.290	.160	.181	.330	.150	.220
117	1856.0	A0023:A0034:A0114:A0201	C3	NA	.400	.340	.118	.430	.290	.148
118	1813.0	SDE-Space Debris Exp	C4	6061-T6 AL	.300	.130	.231	.350	.140	.250
119	1828.0	CRE-Cosmic Ray Exp	C5	NA	.080	.800	.110	.085	.800	.111
120	1828.0	CRE-Cosmic Ray Exp	C6	NA	.080	.800	.110	.085	.800	.111
121	1813.0	SDE-Space Debris Exp	C7	6061-T6 AL	.304	.130	.234	.350	.130	.269
122	1828.0	CRE-Cosmic Ray Exp	C8	NA	.080	.800	.110	.085	.800	.111
123	1856.0	A0023:A0034:A0114:A0201	C9	NA	.400	.340	.118	.430	.290	.148
124	1211.0	--GRAPPLE---	C10	NA	.414	.330	.125	.444	.380	.117
125	1828.0	CRE-Cosmic Ray Exp	C11	NA	.080	.800	.110	.085	.800	.111
126	1718.0	FO -Fiber Optics Exp	C12	NA	.470	.880	.053	.510	.870	.059
127	1828.0	CRE-Cosmic Ray Exp	D1	NA	.080	.800	.110	.085	.800	.111
128	1234.0	A0172:A0189:S0001	D2	NA	.320	.140	.229	.360	.130	.277
129	1856.0	M0002:M0003	D3	NA	.490	.600	.082	.530	.90	.90
130	1828.0	Space Effects on S/C Mat Exp	D4	NA	.300	.610	.049	.340	.600	.057
131	1828.0	CRE-Cosmic Ray Exp	D5	NA	.080	.800	.110	.085	.800	.111
132	1238.0	A0201:S0001	D6	NA	.350	.140	.250	.400	.130	.308
133	1828.0	CRE-Cosmic Ray Exp	D7	NA	.080	.800	.110	.085	.800	.111
134	1828.0	Space Effects on S/C Mat Exp	D8	NA	.300	.610	.049	.340	.600	.057
135	1856.0	M0002:M0003	D9	NA	.490	.600	.082	.530	.90	.90
136	1855.0	Space Plasma H-Voltage Drain Exp	D10	NA	.485	.780	.062	.515	.770	.67
137	1828.0	CRE-Cosmic Ray Exp	D11	NA	.080	.800	.110	.085	.800	.111
138	618.6	A0019:A0023:A0180	D12	NA	.400	.267	.150	.440	.257	.171
139	1813.0	SDE-Space Debris Exp	E1	6061-T6 AL	.290	.140	.207	.340	.140	.243
140	1828.0	CRE-Cosmic Ray Exp	E2	NA	.080	.800	.110	.085	.800	.111
141	1832.0	DSCE-Degr of Solar Cells Exp	E3	NA	.480	.470	.102	.520	.460	.113
142	1813.0	SDE-Space Debris Exp	E4	6061-T6 AL	.310	.140	.221	.360	.176	.205
143	1612.0	A044:A0135:S0050	E5	NA	.330	.410	.080	.364	.400	.91
144	1856.0	A0023:M0002:S1003:S1006	E6	NA	.360	.480	.075	.410	.470	.87
145	1813.0	SDE-Space Debris Exp	E7	6061-T6 AL	.340	.151	.225	.390	.151	.258
146	1368.0	CME-Chem. of UMetoroids Exp	E8	NA	.134	.103	.130	.184	.133	.073
147	1828.0	APEX-Advanced Photovoltaics Exp	E9	NA	.860	.830	.104	.842	.913	.747
148	1828.0	CRE-Cosmic Ray Exp	E10	NA	.080	.800	.110	.085	.800	.111

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	Nominal Surf			End First Year	EOM Surf		
					α	ϵ	α/ϵ		α	ϵ	α/ϵ
149	1813.0	SDE-Space Debris Exp	E11	6061-T6 AL	.300	.160	.1.88	.350	.150	.2.33	.350
150	1612.1	IGE-Interstellar Gas Exp	E12	NA	.200	.925	.0.22	.225	.882	.0.26	.225
151	1813.0	SDE-Space Debris Exp	F1	6061-T6 AL	.300	.150	.2.00	.350	.140	.2.50	.350
152	1828.0	Seeds In Space Exp	F2	6061-T6 AL	.080	.800	.0.10	.085	.800	.0.11	.085
153	1813.0	SDE-Space Debris Exp	F3	6061-T6 AL	.310	.140	.2.21	.360	.140	.2.57	.360
154	1828.0	CRE-Cosmic Ray Exp	F4	NA	.080	.800	.0.10	.085	.800	.0.11	.085
155	1813.0	SDE-Space Debris Exp	F5	6061-T6 AL	.300	.130	.2.31	.350	.130	.2.69	.350
156	1612.0	IGE-Interstellar Gas Exp	F6	NA	.235	.920	.0.26	.350	.830	.0.42	.350
157	1813.0	SDE-Space Debris Exp	F7	6061-T6 AL	.310	.150	.2.07	.360	.150	.2.40	.360
158	1718.0	FO -Fiber Optics Exp	F8	NA	.279	.900	.0.31	.491	.890	.0.55	.491
159	1827.0	Cascade Variable Cond. Heat Pipe	F9	NA	.060	.500	.0.12	.100	.490	.0.20	.100
160	1813.0	SDE-Space Debris Exp	F10	NA	.300	.130	.2.31	.350	.130	.2.69	.350
161	1813.0	SDE-Space Debris Exp	F11	6061-T6 AL	.300	.130	.2.31	.350	.130	.2.69	.350
162	1827.0	HEPP-Low Temperature Heat Pipe	F12	6061-T6 AL	.253	.512	.0.49	.283	.410	.0.69	.283
163	544.0	Longeron and Intercostal	ABC12-1	6061-T6 AL	.340	.170	.2.00	.373	.143	.2.60	.360
164	544.0	Longeron and Intercostal	ABC1-2	6061-T6 AL	.333	.170	.1.96	.366	.143	.2.55	.350
165	544.0	Longeron and Intercostal	ABC2-3	6061-T6 AL	.360	.170	.2.12	.393	.143	.2.74	.430
166	544.0	Longeron and Intercostal	ABC3-4	6061-T6 AL	.333	.180	.1.85	.366	.153	.2.39	.403
167	544.0	Longeron and Intercostal	ABC4-5	6061-T6 AL	.333	.180	.1.85	.366	.153	.2.39	.403
168	544.0	Longeron and Intercostal	ABC5-6	6061-T6 AL	.345	.200	.1.73	.378	.173	.2.18	.385
169	544.0	Longeron and Intercostal	ABC6-7	6061-T6 AL	.340	.160	.2.13	.373	.133	.2.80	.360
170	544.0	Longeron and Intercostal	ABC7-8	6061-T6 AL	.320	.170	.1.88	.353	.143	.2.46	.330
171	544.0	Longeron and Intercostal	ABC8-9	6061-T6 AL	.333	.180	.1.85	.366	.153	.2.39	.383
172	544.0	Longeron and Intercostal	ABC9-10	6061-T6 AL	.325	.180	.1.81	.358	.153	.2.33	.333
173	544.0	Longeron and Intercostal	ABC10-11	6061-T6 AL	.320	.170	.1.88	.353	.143	.2.46	.360
174	544.0	Longeron and Intercostal	ABC11-12	6061-T6 AL	.333	.170	.1.96	.366	.143	.2.55	.333
175	156.0	Earth End Longeron	A12-1	6061-T6 AL	.333	.160	.2.08	.366	.133	.2.74	.353
176	156.0	Earth End Longeron	A1-2	6061-T6 AL	.320	.190	.1.75	.366	.163	.2.24	.325
177	156.0	Earth End Longeron	A2-3	6061-T6 AL	.345	.160	.2.16	.378	.133	.2.83	.415
178	156.0	Earth End Longeron	A3-4	6061-T6 AL	.310	.160	.1.94	.343	.133	.2.57	.380
179	156.0	Earth End Longeron	A4-5	6061-T6 AL	.320	.200	.1.60	.353	.173	.2.04	.370
180	156.0	Earth End Longeron	A5-6	6061-T6 AL	.340	.180	.1.89	.373	.153	.2.43	.380
181	156.0	Earth End Longeron	A6-7	6061-T6 AL	.340	.160	.2.13	.373	.133	.2.83	.415
182	156.0	Earth End Longeron	A7-8	6061-T6 AL	.320	.170	.1.88	.353	.143	.2.46	.330
183	156.0	Earth End Longeron	A8-9	6061-T6 AL	.320	.170	.1.88	.353	.143	.2.46	.320
184	156.0	Earth End Longeron	A9-10	6061-T6 AL	.333	.160	.2.08	.366	.133	.2.74	.333
185	156.0	Earth End Longeron	A10-11	6061-T6 AL	.333	.210	.1.59	.366	.183	.2.00	.373

Table 4. LDEF Thermal Model Node Description. (Cont.)

Ext Area Sq In	Description	Location	Material	α	ε	α/ε	α	ε	α/ε	α	ε	α/ε	α	ε	α/ε
186 156.0	Earth End Longeron	A11-12	6061-T6 AL	.333	.170	.196	.366	.143	.255	.333	.160	.208			
187 156.0	Space End Longeron	F12-1	6061-T6 AL	.333	.170	.196	.366	.143	.255	.353	.140	.252			
188 156.0	Space End Longeron	F1-2	6061-T6 AL	.310	.160	.194	.343	.133	.257	.350	.130	.269			
189 156.0	Space End Longeron	F2-3	6061-T6 AL	.333	.190	.175	.366	.163	.224	.383	.160	.239			
190 156.0	Space End Longeron	F3-4	6061-T6 AL	.310	.160	.194	.343	.133	.257	.370	.130	.285			
191 156.0	Space End Longeron	F4-5	6061-T6 AL	.300	.150	.200	.333	.123	.270	.370	.120	.308			
192 156.0	Space End Longeron	F5-6	6061-T6 AL	.320	.160	.200	.353	.133	.265	.370	.130	.285			
193 156.0	Space End Longeron	F6-7	6061-T6 AL	.310	.160	.194	.343	.133	.257	.350	.150	.233			
194 156.0	Space End Longeron	F7-8	6061-T6 AL	.333	.150	.222	.366	.123	.297	.343	.110	.312			
195 156.0	Space End Longeron	F8-9	6061-T6 AL	.310	.160	.194	.343	.133	.257	.330	.120	.275			
196 156.0	Space End Longeron	F9-10	6061-T6 AL	.320	.170	.188	.353	.143	.246	.330	.140	.236			
197 156.0	Space End Longeron	F10-11	6061-T6 AL	.340	.160	.213	.373	.133	.280	.370	.100	.370			
198 156.0	Space End Longeron	F11-12	6061-T6 AL	.333	.170	.196	.366	.143	.255	.343	.130	.264			
199 120.0	Earth End Structure	G CT	6061-T6 AL	.280	.110	.255	.357	.200	.179	.357	.020	.17.85			
200 188.0	Earth End Structure	G-Y+Z	6061-T6 AL	.280	.110	.255	.357	.200	.179	.357	.020	.17.85			
201 188.0	Earth End Structure	G-Y-Z	6061-T6 AL	.280	.110	.255	.357	.200	.179	.357	.020	.17.85			
202 188.0	Earth End Structure	G+Y-Z	6061-T6 AL	.280	.110	.255	.357	.200	.179	.357	.020	.17.85			
203 188.0	Earth End Structure	G+Y-Z	6061-T6 AL	.280	.110	.255	.357	.200	.179	.357	.020	.17.85			
204 2103.2	Earth End Thermal Cover	G-Y	6061-T6 AL	.850	.110	.773	.897	.092	.975	.897	.092	.975			
205 2103.2	Earth End Thermal Cover	G-Z	6061-T6 AL	.850	.110	.773	.897	.089	.10.08	.897	.089	.10.08			
206 2103.2	Earth End Thermal Cover	G+Y	6061-T6 AL	.860	.110	.782	.907	.100	.907	.907	.100	.907			
207 2103.2	Earth End Thermal Cover	G+Z	6061-T6 AL	.860	.110	.782	.907	.088	.10.31	.907	.088	.10.31			
208 120.0	Space End Structure	H CT	6061-T6 AL	.350	.110	.318	.427	.100	.427	.427	.100	.427			
209 188.0	Space End Structure	H-Y+Z	6061-T6 AL	.350	.110	.318	.427	.100	.427	.427	.100	.427			
210 188.0	Space End Structure	H-Y-Z	6061-T6 AL	.350	.110	.318	.427	.100	.427	.427	.100	.427			
211 188.0	Space End Structure	H Y-Z	6061-T6 AL	.350	.110	.318	.427	.100	.427	.427	.100	.427			
212 188.0	Space End Structure	H+Y+Z	6061-T6 AL	.350	.110	.318	.427	.100	.427	.427	.100	.427			
213 2103.2	Space End Thermal Cover	H-Y	6061-T6 AL	.360	.160	.225	.389	.110	.354	.389	.110	.354			
214 2103.2	Space End Thermal Cover	H-Z	6061-T6 AL	.360	.150	.240	.387	.129	.300	.387	.129	.300			
215 2103.2	Space End Thermal Cover	H+Y	6061-T6 AL	.360	.160	.225	.387	.106	.365	.387	.106	.365			
216 2103.2	Space End Thermal Cover	H+Z	6061-T6 AL	.360	.150	.240	.379	.102	.379	.379	.102	.379			
217 0.0	Center Structure Beam	CD-Y+Z	6061-T6 AL	Z-306	.900	.900	1.00	.900	1.00	.900	.900	.900			
218 0.0	Center Structure Beam	CD-Y-Z	6061-T6 AL	Z-306	.900	.900	1.00	.900	1.00	.900	.900	.900			
219 0.0	Center Structure Beam	CD+Y-Z	6061-T6 AL	Z-306	.900	.900	1.00	.900	1.00	.900	.900	.900			

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	Nominal Surf			End First Year			EOM Surf			
					α	ϵ	α/ϵ	α	ϵ	α/ϵ	α	ϵ	α/ϵ	
220	0.0	Center Structure Beam	CD+Y+Z	6061-T6 AL	.900	1.00	.000	.000	0.00	0.00	.900	.900	1.00	
221	534.0	Center Ring	Z-306	.900	.110	3.30	.406	.079	5.14	.406	.079	5.14		
222	534.0	Center Ring	CD1	6061-T6 AL	.363	.110	3.30	.403	.060	6.72	.403	.060	6.72	
223	534.0	Center Ring	CD2	6061-T6 AL	.363	.110	3.30	.403	.060	6.72	.403	.060	6.72	
224	534.0	Center Ring	CD3	6061-T6 AL	.363	.110	3.30	.403	.083	4.86	.403	.083	4.86	
225	534.0	Center Ring	CD4	6061-T6 AL	.363	.110	3.30	.403	.081	4.98	.403	.081	4.98	
226	534.0	Center Ring	CD5	6061-T6 AL	.363	.110	3.30	.403	.088	4.58	.403	.088	4.58	
227	534.0	Center Ring	CD6	6061-T6 AL	.363	.110	3.30	.403	.069	5.84	.403	.069	5.84	
228	534.0	Center Ring	CD7	6061-T6 AL	.363	.110	3.30	.403	.102	3.95	.403	.102	3.95	
229	534.0	Center Ring	CD8	6061-T6 AL	.363	.110	3.30	.403	.080	5.04	.403	.080	5.04	
230	534.0	Center Ring	CD9	6061-T6 AL	.363	.110	3.30	.402	.071	5.66	.402	.071	5.66	
231	534.0	Center Ring	CD10	6061-T6 AL	.363	.110	3.30	.403	.088	4.58	.403	.088	4.58	
232	534.0	Center Ring	CD11	6061-T6 AL	.363	.110	3.30	.404	.093	4.34	.404	.093	4.34	
233	0.0	***DUMMYY***	CD12	6061-T6 AL	.363	.110	3.30	.403	.093	4.33	.403	.093	4.33	
234	0.0	Shroud - Magnetic Damper	*	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	
235	0.0	Magnetic Damper	H CT	Fiberglass	.000	.000	.000	.000	.000	.000	.000	.000	.000	
236	0.0	Battery Box (A0)39-A)	H CT	NA	.000	.000	.000	.000	.000	.000	.000	.000	.000	
237	0.0	Initiate System	G CT	NA	.000	.000	.000	.000	.000	.000	.000	.000	.000	
238	136.4	Main Trunnion	CD-Z	NA	.000	.000	.000	.000	.000	.000	.000	.000	.000	
239	136.4	Main Trunnion	CD3	PH Steel	.400	.080	5.00	.400	.080	5.00	.400	.080	5.00	
240	544.0	Longeron and Intercostal	CD9	PH Steel	.400	.080	5.00	.400	.080	5.00	.400	.080	5.00	
241	544.0	Longeron and Intercostal	DEF12-1	6061-T6 AL	.333	.170	1.96	.366	.143	2.55	.353	.130	2.72	
242	544.0	Longeron and Intercostal	DEF1-2	6061-T6 AL	.333	.180	1.85	.366	.153	2.39	.373	.150	2.49	
243	544.0	Longeron and Intercostal	DEF2-3	6061-T6 AL	.333	.200	1.67	.366	.173	2.11	.383	.170	2.25	
244	544.0	Longeron and Intercostal	DEF3-4	6061-T6 AL	.333	.170	1.96	.366	.143	2.55	.393	.150	2.62	
245	544.0	Longeron and Intercostal	DEF4-5	6061-T6 AL	.300	.180	1.67	.333	.153	2.17	.370	.150	2.47	
246	544.0	Longeron and Intercostal	DEF5-6	6061-T6 AL	.320	.160	2.00	.353	.133	2.65	.370	.130	2.85	
247	544.0	Longeron and Intercostal	DEF6-7	6061-T6 AL	.320	.170	1.88	.353	.143	2.46	.360	.160	2.25	
248	544.0	Longeron and Intercostal	DEF7-8	6061-T6 AL	.333	.170	1.96	.366	.143	2.55	.343	.140	2.45	
249	544.0	Longeron and Intercostal	DEF8-9	6061-T6 AL	.320	.170	1.88	.353	.143	2.46	.340	.140	2.43	
250	544.0	Longeron and Intercostal	DEF9-10	6061-T6 AL	.320	.170	1.88	.353	.143	2.46	.330	.140	2.36	
251	544.0	Longeron and Intercostal	DEF10-11	6061-T6 AL	.320	.180	1.78	.353	.153	2.30	.350	.120	2.92	
252	819.0	Biostack	DEF11-12	6061-T6 AL	.333	.180	1.85	.366	.153	2.39	.343	.150	2.29	
253	812.0	SDE-Space Debris Exp	G2	NA	.321	.300	1.07	.400	.502	0.80	.400	.098	4.08	
254	1030.0	A0139A	G6	NA	.201	.905	0.22	.242	.905	0.27	.370	.040	9.25	
255	812.0	SDE-Space Debris Exp	G4	6061-T6 AL	.300	.060	5.00	.370	.040	9.25	.370	.040	9.25	

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	Nominal Surf			End First Year			EOM Surf		
					α	ϵ	α/ϵ	α	ϵ	α/ϵ	α	ϵ	α/ϵ
256	1440.0	--Blind Cover Plate---	G9	6061-T6 AL	.293	.157	1.87	.320	.135	2.37	.320	.135	2.37
257	1500.0	--Blind Cover Plate---	G CT	6061-T6 AL	.240	.100	2.40	.262	.080	3.28	.262	.080	3.28
258	1440.0	--Blind Cover Plate---	G3	6061-T6 AL	.301	.196	1.54	.328	.174	1.89	.328	.174	1.89
259	943.0	IDE-Interplanetary Dust Exp	G10	NA	.340	.540	0.63	.380	.530	0.72	.380	.530	0.72
260	516.0	A0056:A0147:A0172:M0002	G12	NA	.300	.600	0.50	.340	.590	0.58	.340	.590	0.58
261	944.0	HEPP-Low Temperature Heat Pipe	H1	NA	.450	.723	0.62	.500	.713	0.70	.500	.713	0.70
262	941.0	A0023:A0201	H11	NA	.675	.390	1.73	.720	.360	2.00	.720	.360	2.00
263	820.0	Metal Dielectrics/Composites	H7	NA	.935	.795	1.18	.970	.790	1.23	.970	.790	1.23
264	1030.0	IGE-Interstellar Gas Exp	H6	NA	.230	.915	0.25	.350	.880	0.40	.350	.880	0.40
265	812.0	SDE-Space Debris Exp	H5	NA	.480	.060	8.00	.520	.040	13	.520	.040	13
266	1030.0	IGE-Interstellar Gas Exp	H9	NA	.230	.915	0.25	.350	.800	0.44	.350	.800	0.44
267	1600.0	Blind Cover Plate	HCT	6061-T6 AL	.290	.080	3.63	.330	.050	6.60	.330	.050	6.60
268	998.2	HIS-Heavy Ion in Space	H3	6061-T6 AL	.262	.864	0.30	.357	.860	0.42	.357	.860	0.42
269	998.2	HIS-Heavy Ion in Space	H12	6061-T6 AL	.262	.864	0.30	.357	.860	0.42	.357	.860	0.42
270	189.0	Keel	CD6	PH Steel	.400	.080	5.00	.400	.080	5.00	.400	.080	5.00
271	366.0	Graph/Poly,Graph/EP Mech Prop (2)	A1	NA	.360	.210	1.71	.400	.200	2.00	.400	.200	2.00
272	314.0	Graph/Poly,Graph/EP Mech Prop (2)	A7	NA	.190	.150	1.27	.230	.130	1.77	.230	.130	1.77
273	619.0	FRECPA French (2)	B3	NA	.440	.790	0.56	.480	.780	0.62	.480	.780	0.62
274	397.0	--Grapple--(2)	C1	NA	.700	.850	0.82	.720	.840	0.86	.720	.840	0.86
275	397.0	--Grapple--(2)	C10	NA	.700	.850	0.82	.720	.840	0.86	.720	.840	0.86
276	1339.0	:A0015:A0187:M0006 (2)	C2	NA	.340	.440	0.77	.380	.430	0.88	.380	.430	0.88
277	308.0	:A0172:A0189:S0001 (2)	D2	NA	.350	.370	0.95	.390	.360	1.08	.390	.360	1.08
278	308.0	:A0172:A0189:S0001 (3)	D2	NA	.370	.870	0.43	.410	.860	0.48	.410	.860	0.48
279	618.0	:A0201:S0001 (2)	D6	NA	.316	.486	0.65	.356	.476	0.75	.356	.476	0.75
280	308.0	:A0019:A0023:A0180 (2)	D12	NA	.320	.310	1.03	.360	.300	1.20	.360	.300	1.20
281	928.0	:A0019:A0023:A0180 (3)	D12	NA	.580	.570	1.02	.620	.560	1.11	.620	.560	1.11
282	115.0	Metal Dielectrics/Composites (2)	H7	NA	.960	.790	1.22	.980	.780	1.26	.980	.780	1.26
283	258.0	:A0056:A0147:A0172:M0002 (2)	G12	NA	.520	.350	1.49	.560	.340	1.65	.560	.340	1.65
284	258.0	:A0056:A0147:A0172:M0002 (3)	G12	NA	.350	.700	0.50	.390	.690	0.57	.390	.690	0.57
285	399.0	Scuff Plate, Main	CD3	Aluminum	.500	.850	0.59	.500	.850	0.59	.500	.850	0.59
286	399.0	Scuff Plate, Main	CD9	Aluminum	.500	.850	0.59	.500	.850	0.59	.500	.850	0.59
287	856.6	End Support Beam (1 OF 3)	G3	Aluminum	.200	.060	3.33	.200	.060	3.33	.200	.060	3.33
288	1689.8	End Support Beam (2 OF 3)	G CT	Aluminum	.200	.060	3.33	.200	.060	3.33	.200	.060	3.33
289	478.8	End Scuff Plate	G3	Aluminum	.400	.080	5.00	.400	.080	5.00	.400	.080	5.00
290	136.4	End Trunnion Pin	G3	PH Steel	.200	.050	4.00	.200	.060	3.33	.200	.040	5.00
291	856.6	End Support Beam (3 OF 3)	G9	Aluminum	.500	.850	0.59	.500	.850	0.59	.500	.850	0.59
292	478.8	End Scuff Plate	G9	Aluminum	.500	.850	0.59	.500	.850	0.59	.500	.850	0.59

Table 4. LDEF Thermal Model Node Description. (Cont.)

Node	Ext Area Sq In	Description	Location	Material	α	ϵ	α/ϵ	α	ϵ	α/ϵ	α	ϵ	α/ϵ	EOM Surf
293	136.4	End Trunnion Pin	G9	PH Steel	.400	.110	3.64	.400	.088	4.55	.400	.088	4.55	n/a
294	243.8	Earth End Thermal Panel (Side)	ROW 1	6061-T6 AL	.860	.110	7.82	.907	.088	10.31	.907	.088	10.31	n/a
295	243.8	Earth End Thermal Panel (Side)	ROW 2	6061-T6 AL	.850	.110	7.73	.897	.092	9.75	.897	.092	9.75	n/a
296	243.8	Earth End Thermal Panel (Side)	ROW 3	6061-T6 AL	.850	.110	7.73	.897	.092	9.75	.897	.092	9.75	n/a
297	243.8	Earth End Thermal Panel (Side)	ROW 4	6061-T6 AL	.850	.110	7.73	.897	.092	9.75	.897	.092	9.75	n/a
298	243.8	Earth End Thermal Panel (Side)	ROW 5	6061-T6 AL	.850	.110	7.73	.897	.089	10.08	.897	.092	9.75	n/a
299	243.8	Earth End Thermal Panel (Side)	ROW 6	6061-T6 AL	.850	.110	7.73	.897	.089	10.08	.897	.089	10.08	n/a
300	243.8	Earth End Thermal Panel (Side)	ROW 7	6061-T6 AL	.850	.110	7.73	.897	.089	10.08	.897	.089	10.08	n/a
301	243.8	Earth End Thermal Panel (Side)	ROW 8	6061-T6 AL	.860	.110	7.82	.907	.100	9.07	.907	.100	9.07	n/a
302	243.8	Earth End Thermal Panel (Side)	ROW 9	6061-T6 AL	.860	.110	7.82	.907	.100	9.07	.907	.100	9.07	n/a
303	243.8	Earth End Thermal Panel (Side)	ROW 10	6061-T6 AL	.860	.110	7.82	.907	.100	9.07	.907	.100	9.07	n/a
304	243.8	Earth End Thermal Panel (Side)	ROW 11	6061-T6 AL	.860	.110	7.82	.907	.088	10.31	.907	.088	10.31	n/a
305	243.8	Earth End Thermal Panel (Side)	ROW 12	6061-T6 AL	.860	.110	7.82	.907	.088	10.31	.907	.088	10.31	n/a
306	243.8	Earth End Thermal Panel (Side)	ROW 1	6061-T6 AL	.360	.150	2.40	.389	.128	3.04	.389	.128	3.04	n/a
307	243.8	Earth End Thermal Panel (Side)	ROW 2	6061-T6 AL	.360	.160	2.25	.389	.137	2.84	.389	.137	2.84	n/a
308	243.8	Earth End Thermal Panel (Side)	ROW 3	6061-T6 AL	.360	.160	2.25	.389	.137	2.84	.389	.137	2.84	n/a
309	243.8	Earth End Thermal Panel (Side)	ROW 4	6061-T6 AL	.360	.160	2.25	.389	.137	2.84	.389	.137	2.84	n/a
310	243.8	Earth End Thermal Panel (Side)	ROW 5	6061-T6 AL	.360	.150	2.40	.385	.129	2.98	.385	.129	2.98	n/a
311	243.8	Earth End Thermal Panel (Side)	ROW 6	6061-T6 AL	.360	.150	2.40	.385	.129	2.98	.385	.129	2.98	n/a
312	243.8	Earth End Thermal Panel (Side)	ROW 7	6061-T6 AL	.360	.150	2.40	.385	.129	2.98	.385	.129	2.98	n/a
313	243.8	Earth End Thermal Panel (Side)	ROW 8	6061-T6 AL	.360	.160	2.25	.353	.146	2.42	.367	.146	2.51	n/a
314	243.8	Earth End Thermal Panel (Side)	ROW 9	6061-T6 AL	.360	.160	2.25	.383	.146	2.62	.383	.146	2.62	n/a
315	243.8	Earth End Thermal Panel (Side)	ROW 10	6061-T6 AL	.360	.160	2.25	.383	.146	2.62	.383	.146	2.62	n/a
316	243.8	Earth End Thermal Panel (Side)	ROW 11	6061-T6 AL	.360	.150	2.40	.389	.128	3.04	.389	.128	3.04	n/a
317	243.8	Earth End Thermal Panel (Side)	ROW 12	6061-T6 AL	.360	.150	2.40	.389	.128	3.04	.389	.128	3.04	n/a
318	0.0	Int. Stiffener Conn. Nodes 175 -> 223	EE 12	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
319	0.0	Int. Stiffener Conn. Nodes 180 -> 223	EE 6	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
320	0.0	Int. Stiffener Conn. Nodes 181 -> 229	EE 6	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
321	0.0	Int. Stiffener Conn. Nodes 186 -> 229	EE 12	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
322	0.0	Int. Stiffener Conn. Nodes 187 -> 223	SE 12	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
323	0.0	Int. Stiffener Conn. Nodes 192 -> 223	SE 6	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
324	0.0	Int. Stiffener Conn. Nodes 193 -> 229	SE 6	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
325	0.0	Int. Stiffener Conn. Nodes 198 -> 229	SE 12	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
326	0.0	Aluminum Block, Thermocouple	LG 6-7 @B3	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
327	0.0	Aluminum Block, Thermocouple	Earth End	6061-T6 AL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 5. Calculated Thermal Model Uncertainty.

Measurement Location	Uncertainty (\pm °F) 1σ	Uncertainty (\pm °F) 3σ
Thermistor	3	9
Radiometer	5	15
Center Ring	3	9
Row 6 Longeron	4	12
Earth End Structure	4	12
Space End Structure	3	9
Damper Dome	6	18

Table 6. Comparison of LDEF Temperature Ranges.

LDEF Location	Temperature Design Limits °F	Measured (THERM) °F	Post Flight Calculated °F
Interior Average	10 - 120	52 - 89	58 - 89
Structure North/South (Rows 6/12)	-10 - 150	35 - 134	39 - 136
Structure East/West (Rows 3/9)	-10 - 150	N/A	53 - 100
Structure Earth End	10 - 135	56 - 103	57 - 104
Structure Space End	10 - 135	60 - 90	64 - 96

Table 7. Calculated Min/Max Orbital Temperatures

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
1	-100.0	250.0	98.4	114.8	60.6	68.8	69.3	72.5
2	-50.0	142.0	76.4	80.6	59.8	63.4	67.2	68.4
3	-16.0	147.0	77.6	81.1	73.6	78.3	81.1	83.9
4	-50.0	142.0	61.9	63.6	61.8	66.0	81.0	85.2
5	-100.0	250.0	56.7	59.2	64.0	88.6	111.2	150.3
6	-100.0	250.0	57.0	59.6	58.3	68.5	121.9	157.2
7	-100.0	250.0	60.6	63.0	61.0	66.6	104.5	119.3
8	-100.0	250.0	31.0	35.0	40.5	82.5	69.8	129.5
9	-1.0	149.0	61.4	62.6	63.4	66.7	78.8	81.2
10	-50.0	142.0	70.6	73.4	60.6	63.7	70.0	71.2
11	-100.0	250.0	107.4	124.4	72.8	83.2	74.3	76.3
12	-100.0	250.0	107.2	137.2	58.7	66.3	66.0	69.1
13	-100.0	250.0	106.0	141.0	56.8	71.6	64.5	67.2
14	-100.0	250.0	89.2	128.6	64.0	93.7	65.6	68.4
15	-18.0	154.0	83.5	86.4	75.4	78.8	84.1	86.2
16	-19.0	155.0	66.7	68.3	64.9	69.1	84.2	88.6
17	-50.0	142.0	56.7	57.4	52.3	55.1	82.4	86.8
18	-100.0	250.0	55.1	57.4	52.4	61.6	115.1	153.6
19	-50.0	142.0	55.6	56.3	50.5	51.7	86.6	90.2
20	-22.0	185.0	50.2	52.2	59.7	74.7	93.3	115.4
21	-14.0	153.0	61.9	63.2	63.1	66.7	78.0	80.9
22	-8.0	140.0	74.6	76.9	62.6	65.2	72.7	73.5
23	-100.0	250.0	89.4	125.5	59.0	82.6	64.6	67.2
24	-18.0	150.0	94.8	98.0	57.7	58.6	71.0	71.8
25	-250.0	228.0	104.3	128.1	46.5	55.8	50.3	52.0
26	-15.0	145.0	89.8	94.3	65.3	68.6	64.5	65.4
27	-16.0	150.0	74.2	78.1	67.6	72.4	75.5	78.5
28	-100.0	250.0	62.3	72.7	65.4	100.4	84.2	121.2
29	-50.0	142.0	55.3	55.9	51.4	54.0	80.2	84.2
30	-50.0	142.0	53.5	54.1	47.8	49.0	88.2	91.9
31	-100.0	250.0	54.2	56.2	54.5	67.4	109.1	145.3
32	-50.0	142.0	35.8	36.4	35.3	38.6	61.0	65.8
33	-16.0	150.0	64.7	66.4	67.4	71.9	82.5	86.1
34	-250.0	228.0	70.7	92.9	58.5	80.9	59.1	65.4
35	-50.0	142.0	72.5	75.7	51.8	53.8	62.7	63.5
36	-70.0	180.0	89.5	98.9	39.7	41.9	49.8	51.1
37	-50.0	142.0	73.2	76.7	47.6	49.3	59.0	59.7
38	-50.0	200.0	75.2	112.4	54.2	82.5	52.6	55.0
39	-12.0	157.0	62.9	68.5	60.6	67.4	65.6	69.4
40	3.0	139.0	55.3	56.2	62.3	64.8	80.3	83.1
41	-50.0	142.0	49.4	50.1	50.6	53.2	79.3	83.4
42	-10.0	148.0	50.0	51.5	53.9	60.0	116.8	143.4
43	-50.0	142.0	48.7	49.3	48.5	49.6	83.9	87.3
44	3.0	139.0	49.6	50.0	58.8	60.6	87.5	90.4
45	-12.0	157.0	54.6	57.2	60.2	66.5	74.0	79.2
46	-19.0	155.0	71.5	74.9	63.7	67.1	70.3	71.1
47	-50.0	142.0	67.8	71.0	50.3	52.2	59.9	60.7
48	-19.0	153.0	103.2	119.3	42.1	45.3	48.4	49.8
49	-100.0	250.0	97.0	131.6	52.4	67.1	56.9	59.7
50	-50.0	142.0	62.7	66.9	51.9	55.0	59.5	60.5

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
	-5.0	150.0	66.4	69.7	66.9	70.9	69.9	72.3
51	-100.0	250.0	54.3	65.4	62.8	99.2	79.5	118.2
52	-100.0	150.0	36.8	38.4	52.0	61.0	95.7	111.1
53	-100.0	144.0	35.4	36.8	40.8	43.3	103.7	112.3
54	-100.0	250.0	46.2	48.9	52.9	67.0	106.1	145.9
55	-50.0	250.0	53.2	55.0	62.9	68.3	90.3	98.7
56	-5.0	138.0	54.8	56.6	63.1	67.0	76.2	79.4
57	-50.0	142.0	58.6	61.4	53.8	56.5	62.2	62.9
58	-100.0	250.0	80.6	116.9	55.5	78.9	57.2	59.8
59	-12.0	142.0	44.3	51.6	13.7	15.6	21.5	22.8
60	-100.0	250.0	103.0	139.1	58.6	75.1	57.3	60.8
61	0.0	90.0	62.9	66.9	52.4	55.6	52.2	53.0
62	-100.0	250.0	66.0	97.6	70.1	110.9	70.5	91.4
63	-50.0	142.0	51.2	53.3	60.8	65.7	73.8	78.7
64	-100.0	250.0	44.4	47.8	62.8	90.0	104.7	147.1
65	-16.0	142.0	4.2	12.7	12.7	34.7	48.9	102.6
66	-100.0	250.0	40.7	44.0	55.0	67.9	106.1	143.4
67	-2.0	138.0	37.9	38.7	58.3	61.1	84.9	89.2
68	-14.0	150.0	62.9	66.5	70.1	77.7	80.6	86.0
69	-100.0	250.0	71.4	102.7	69.0	102.2	67.1	76.6
70	-100.0	250.0	88.1	124.4	65.6	88.5	60.5	64.0
71	-1.0	112.0	88.8	92.7	68.3	71.0	71.1	72.9
72	-100.0	250.0	65.9	69.2	68.8	76.4	96.9	102.1
73	-10.0	143.0	56.3	57.3	55.2	56.8	79.5	81.6
74	-100.0	250.0	70.1	73.2	71.8	78.2	96.0	99.9
75	-150.0	300.0	73.0	74.2	63.9	65.4	79.8	81.0
77	-10.0	150.0	80.0	81.9	64.8	67.2	73.4	74.8
79	-22.0	185.0	72.0	75.0	57.9	62.2	66.4	68.9
80	-4.0	104.0	81.3	83.4	64.2	66.8	71.7	73.5
81	-13.0	154.0	73.3	86.2	82.6	103.1	72.1	84.4
82	-10.0	146.0	48.8	52.3	70.3	76.4	81.0	85.4
83	-8.0	142.0	17.0	20.7	37.0	45.4	45.5	51.0
84	-100.0	250.0	61.9	82.1	80.9	115.6	87.7	109.1
85	-8.0	142.0	24.2	28.3	40.1	48.8	40.2	45.5
86	-50.0	200.0	69.4	95.3	89.1	135.3	83.9	112.6
87	-39.0	123.0	62.8	63.3	72.8	73.7	75.1	75.7
88	-39.0	123.0	68.4	69.0	71.3	72.4	68.0	68.7
89	28.0	196.0	73.9	76.0	67.8	69.1	68.5	69.4
90	-125.0	250.0	-70.0	245.0	-99.1	97.5	-109.1	-71.0
91	-100.0	54.0	-51.6	4.0	-60.6	-11.5	-57.8	-54.6
92	-50.0	150.0	58.6	66.5	63.5	75.3	56.1	62.0
93	-100.0	54.0	-60.0	-40.7	-59.5	-1.5	-50.5	0.6
94	-100.0	250.0	56.2	59.5	63.3	96.6	110.6	160.4
95	-100.0	250.0	56.9	60.4	56.9	70.4	117.7	165.3
96	-125.0	250.0	-109.0	-87.5	-97.0	32.4	-47.1	197.7
97	-90.0	245.0	30.3	34.3	39.7	82.7	68.9	130.2
98	-100.0	250.0	-36.8	-25.9	-23.3	13.8	-16.9	13.1
99	-100.0	54.0	-56.1	-7.0	-60.7	-5.9	-56.4	-37.9
100	-100.0	250.0	109.8	141.9	73.0	94.3	72.9	74.6
101	-100.0	250.0	103.8	142.3	57.1	66.9	65.9	69.7
102	-100.0	250.0						

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
103	-100.0	250.0	103.9	152.1	56.4	76.7	64.7	68.3
104	-100.0	250.0	88.1	139.6	63.9	104.8	65.2	68.9
105	-25.0	230.0	118.8	152.5	128.4	170.7	86.9	107.5
106	-90.0	214.0	-67.8	-26.7	-37.8	97.2	-30.1	107.7
107	-100.0	54.0	-62.7	-59.7	-64.3	-21.3	-48.9	9.6
108	-100.0	250.0	54.8	57.8	51.1	63.4	112.0	164.1
109	-100.0	54.0	-63.2	-60.2	-65.6	-42.1	-47.8	7.7
110	-22.0	194.0	29.6	33.1	44.9	104.8	80.2	165.2
111	-68.0	111.0	-6.8	10.0	25.8	62.8	27.2	58.5
112	-117.0	124.0	-45.0	-14.2	-48.9	-14.9	-67.3	-56.8
113	-100.0	250.0	87.1	134.4	57.5	89.3	64.2	67.5
114	-96.0	185.0	79.4	122.4	-45.2	-35.3	-63.9	-61.5
115	-150.0	250.0	100.2	136.3	40.2	54.0	43.4	45.7
116	38.0	173.0	106.7	118.6	71.1	80.1	51.8	52.6
117	-47.0	181.0	49.0	83.6	55.7	97.0	32.5	54.3
118	-100.0	250.0	61.8	76.1	64.6	113.9	82.4	132.4
119	-100.0	54.0	-63.4	-60.4	-64.7	-21.7	-50.1	8.7
120	-100.0	54.0	-64.2	-61.2	-66.7	-52.7	-46.8	6.5
121	-100.0	250.0	54.3	57.1	53.0	70.9	106.1	155.1
122	-100.0	54.0	-7.9	-6.8	-8.2	11.2	9.1	32.8
123	-47.0	181.0	23.0	44.7	59.8	106.2	61.7	101.1
124	-150.0	250.0	63.7	96.3	51.4	84.5	51.2	60.8
125	-100.0	54.0	-54.9	2.2	-64.9	-24.6	-59.9	-56.8
126	-68.0	143.0	37.1	112.6	-28.1	-10.3	-28.0	-23.7
127	-100.0	54.0	-53.7	2.2	-66.6	-41.7	-61.7	-58.5
128	-100.0	250.0	75.7	116.7	54.1	85.3	51.9	54.4
129	-93.0	245.0	17.6	75.6	21.4	93.7	3.6	38.7
130	-100.0	250.0	-37.4	-23.4	-6.0	44.7	6.2	58.8
131	-100.0	54.0	-66.1	-63.0	-65.1	-22.0	-50.5	8.5
132	-100.0	250.0	48.9	50.5	53.3	60.7	117.8	152.5
133	-100.0	54.0	-66.4	-63.3	-66.5	-42.9	-49.1	6.8
134	-100.0	250.0	-54.6	-52.0	-16.0	24.7	20.6	79.2
135	-93.0	145.0	-5.5	27.4	16.1	86.0	19.8	79.0
136	-90.0	214.0	-41.9	85.6	-48.8	81.4	-72.1	-28.5
137	-100.0	54.0	-57.0	0.6	-65.6	-25.1	-61.2	-58.1
138	-40.0	181.0	102.8	125.7	39.3	44.6	45.2	46.5
139	-100.0	250.0	94.8	142.0	51.8	71.8	57.0	60.6
140	-100.0	54.0	-57.9	-0.5	-64.4	-14.4	-61.4	-58.1
141	-196.0	225.0	35.9	86.7	42.4	105.4	17.7	48.3
142	-100.0	250.0	53.9	68.8	62.1	112.8	77.8	129.4
143	-99.0	150.0	21.5	22.8	41.7	59.9	93.7	123.5
144	-56.0	177.0	-3.7	-1.5	6.8	17.3	98.8	150.4
145	-100.0	250.0	46.1	49.6	51.6	71.0	103.7	157.5
146	-100.0	311.0	40.2	40.8	62.0	75.1	97.1	116.1
147	-87.0	194.0	-6.2	39.0	13.2	101.1	16.6	91.8
148	-100.0	54.0	-61.7	-11.2	-63.9	-8.2	-60.2	-40.5
149	-100.0	250.0	77.5	125.1	53.6	85.1	56.4	59.8
150	-100.0	94.0	19.8	42.4	-8.4	-3.3	-2.5	-1.4
151	-100.0	250.0	101.1	150.6	57.6	79.8	56.7	61.1
152	-50.0	100.0	-36.1	9.8	-42.1	-2.2	-42.6	-40.0

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
153	-100.0	250.0	65.2	106.7	69.7	125.4	70.0	97.6
154	-100.0	54.0	-64.9	-44.9	-59.9	-1.7	-53.8	-1.7
155	-100.0	250.0	43.9	48.3	62.4	99.6	105.2	160.3
156	-100.0	100.0	-10.4	-3.7	-1.7	21.8	34.3	104.4
157	-100.0	250.0	40.0	44.2	53.2	70.8	103.1	152.4
158	-69.0	178.0	-52.5	-49.4	-23.9	41.1	2.7	90.5
159	-100.0	100.0	-105.1	-102.5	-71.2	-63.3	-75.4	-68.9
160	-100.0	250.0	68.9	110.1	66.9	111.7	66.0	79.3
161	-100.0	250.0	85.8	133.3	63.9	95.1	60.0	64.4
162	-50.0	150.0	21.1	106.9	-55.5	-34.4	-69.5	-64.3
163	10.0	130.0	105.8	113.0	57.3	59.3	65.7	66.7
164	10.0	130.0	101.4	110.2	62.9	67.8	66.2	67.2
165	10.0	130.0	87.4	94.8	70.4	77.4	73.0	75.2
166	10.0	130.0	71.3	75.1	70.8	77.8	85.4	91.1
167	10.0	130.0	63.9	65.2	66.5	72.5	94.4	102.2
168	10.0	130.0	57.5	58.1	58.7	62.3	114.0	122.7
169	10.0	130.0	59.0	59.7	58.9	60.6	118.8	127.1
170	10.0	130.0	53.8	54.5	60.0	64.0	103.5	111.5
171	10.0	130.0	58.4	59.5	64.2	70.0	88.1	94.8
172	10.0	130.0	71.2	75.3	66.7	72.7	76.6	79.9
173	10.0	130.0	88.3	95.0	66.5	71.9	69.6	70.4
174	10.0	130.0	100.3	107.3	60.4	63.5	67.6	68.5
175	10.0	130.0	122.9	131.5	68.7	71.9	71.0	72.1
176	10.0	130.0	106.9	115.2	68.8	73.7	69.6	70.3
177	10.0	130.0	94.7	102.9	80.1	88.1	78.7	81.2
178	10.0	130.0	77.8	82.2	82.0	90.1	94.5	100.7
179	10.0	130.0	62.7	64.1	74.7	81.4	113.6	122.8
180	10.0	130.0	60.8	61.8	71.7	76.9	135.5	145.8
181	10.0	130.0	61.0	62.0	69.2	71.7	135.9	144.7
182	10.0	130.0	53.0	53.9	67.0	72.5	114.6	124.9
183	10.0	130.0	56.9	58.6	73.0	81.5	101.7	112.0
184	10.0	130.0	80.8	86.4	79.4	87.2	85.7	90.1
185	10.0	130.0	105.5	113.1	76.8	82.7	73.9	74.9
186	10.0	130.0	123.7	131.9	74.3	78.3	72.5	73.6
187	10.0	130.0	110.0	121.0	72.8	80.5	64.7	69.0
188	10.0	130.0	95.7	106.4	67.5	74.3	61.0	62.6
189	10.0	130.0	76.5	88.6	75.8	89.6	69.3	75.5
190	10.0	130.0	68.2	76.5	82.3	96.3	82.8	92.9
191	10.0	130.0	52.7	55.1	76.1	84.9	104.2	115.4
192	10.0	130.0	42.6	47.1	67.3	77.3	113.0	126.7
193	10.0	130.0	39.8	44.2	62.6	70.6	116.7	129.3
194	10.0	130.0	43.4	44.9	66.6	71.2	108.3	117.8
195	10.0	130.0	55.7	60.3	74.9	84.9	89.7	98.6
196	10.0	130.0	73.8	81.6	81.8	93.7	79.8	86.1
197	10.0	130.0	93.6	104.3	81.4	89.8	69.3	71.0
198	10.0	130.0	104.7	113.9	78.2	85.1	66.5	70.5
199	30.0	120.0	71.7	72.8	63.0	64.9	78.5	79.7
200	30.0	120.0	87.3	90.8	67.1	70.1	74.3	75.7
201	30.0	120.0	69.5	71.2	71.8	75.8	98.1	102.3
202	30.0	120.0	65.0	66.5	69.1	72.8	100.4	104.4

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
203	30.0	120.0	85.5	88.5	68.2	71.7	76.1	77.7
204	-100.0	300.0	100.2	140.7	95.5	156.9	101.0	139.2
205	-100.0	300.0	70.7	129.9	71.1	171.5	115.6	212.9
206	-100.0	300.0	69.2	131.2	64.9	175.9	82.5	157.8
207	-100.0	300.0	101.6	189.8	68.7	176.1	80.1	141.9
208	30.0	115.0	67.2	72.9	83.4	93.4	80.6	86.9
209	30.0	115.0	79.2	84.8	74.4	83.1	72.1	77.4
210	30.0	115.0	59.8	65.0	78.1	87.4	87.0	93.5
211	30.0	115.0	46.8	51.2	67.5	75.6	83.6	89.6
212	30.0	115.0	75.9	81.1	80.5	88.3	72.9	77.4
213	-100.0	300.0	48.5	127.6	53.5	180.4	56.8	138.8
214	-100.0	300.0	25.7	110.2	41.0	173.6	72.9	163.3
215	-100.0	300.0	43.0	126.8	51.8	186.4	61.2	148.1
216	-100.0	300.0	68.5	153.8	53.2	180.9	51.5	134.0
217	20.0	120.0	79.4	80.9	63.1	64.4	75.7	76.9
218	20.0	120.0	68.1	69.3	64.2	65.8	87.3	89.1
219	20.0	120.0	65.4	66.6	62.5	64.2	89.4	91.4
220	20.0	120.0	75.6	76.9	63.0	64.5	77.4	78.6
221	10.0	130.0	109.8	116.5	58.9	61.8	62.1	62.6
222	10.0	130.0	93.6	101.6	67.2	73.2	65.9	66.5
223	10.0	130.0	74.1	75.6	68.8	71.0	75.1	76.6
224	10.0	130.0	64.2	66.3	71.9	78.9	94.0	101.5
225	10.0	130.0	58.2	58.6	66.6	71.4	111.6	119.2
226	10.0	130.0	55.7	56.0	63.0	64.0	126.9	130.1
227	10.0	130.0	55.7	56.1	62.0	64.5	121.8	129.4
228	10.0	130.0	54.9	55.4	64.8	70.0	100.7	108.3
229	10.0	130.0	63.6	64.5	68.0	69.8	83.4	84.8
230	10.0	130.0	81.5	87.6	69.6	76.1	71.8	73.1
231	10.0	130.0	97.5	104.6	64.6	69.1	66.5	67.0
232	10.0	130.0	108.4	114.3	55.0	56.2	61.3	61.7
233	25.0	105.0	69.8	82.9	62.5	78.7	79.6	93.3
234	20.0	110.0	71.9	72.6	66.8	67.9	83.5	84.3
235	20.0	110.0	72.4	72.4	69.7	69.9	84.3	84.4
236	0.0	120.0	74.6	74.9	64.9	65.5	84.4	84.9
237	0.0	130.0	65.5	66.5	62.7	64.2	90.2	92.0
238	-100.0	150.0	57.1	59.0	48.7	51.4	48.7	51.7
239	-100.0	150.0	38.3	41.9	46.9	50.7	61.8	65.6
240	10.0	130.0	99.0	105.8	53.1	54.8	57.6	58.4
241	10.0	130.0	90.4	98.9	58.8	63.5	59.8	60.6
242	10.0	130.0	72.1	79.2	64.8	71.6	66.7	69.0
243	10.0	130.0	63.8	67.9	68.9	76.2	79.0	84.8
244	10.0	130.0	52.3	53.7	64.0	69.7	92.4	100.1
245	10.0	130.0	45.3	46.2	55.1	58.6	107.1	115.0
246	10.0	130.0	46.5	47.3	54.2	56.1	113.2	121.5
247	10.0	130.0	50.3	51.1	60.8	64.4	101.8	109.2
248	10.0	130.0	54.9	56.0	65.1	70.1	86.5	92.2
249	10.0	130.0	67.6	71.6	67.7	73.5	74.7	77.9
250	10.0	130.0	82.3	89.4	65.9	71.3	65.9	66.6
251	10.0	130.0	92.3	99.7	56.1	59.3	57.9	58.7
252	2.0	82.0	59.4	61.9	48.9	53.6	46.4	48.8

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
	-100.0	250.0	66.5	73.9	68.2	83.5	95.7	106.6
253	-100.0	91.0	24.6	25.3	26.3	27.6	39.7	40.4
254	-100.0	250.0	70.6	77.9	71.3	85.1	95.4	105.1
255	-100.0	250.0	62.6	76.1	54.9	79.4	72.6	89.0
256	-100.0	250.0	69.7	70.9	63.0	65.7	77.0	78.6
257	-100.0	250.0	63.5	75.9	54.5	76.8	69.9	85.5
258	-100.0	200.0	23.6	30.9	23.7	36.8	19.5	26.5
259	-100.0	217.0	55.9	61.6	44.7	54.9	50.9	56.5
260	-150.0	99.0	1.9	74.2	35.4	153.7	13.1	87.0
261	-62.0	147.0	-33.4	-18.3	15.4	42.0	-27.5	-11.3
262	-150.0	467.0	50.9	115.3	71.2	179.5	52.0	119.4
263	-100.0	250.0	-4.1	10.0	15.7	46.3	22.3	40.1
264	-100.0	99.0	2.5	16.5	19.3	50.0	18.2	36.5
265	-100.0	250.0	62.5	106.2	79.7	152.3	87.9	133.2
266	-100.0	99.0	69.5	96.1	89.5	137.1	84.1	113.6
267	-100.0	200.0	69.5	-44.2	-35.4	12.3	-58.7	-30.6
268	-44.0	78.0	-68.3	-42.5	-35.7	12.0	-60.7	-32.7
269	-44.0	78.0	-66.6	-42.5	-35.7	174.7	-130.3	72.2
270	-20.0	130.0	54.7	55.2	65.6	70.4	129.2	132.4
271	-66.0	268.0	160.7	202.3	48.4	64.3	31.3	33.4
272	-66.0	268.0	58.7	60.5	60.4	65.3	106.3	123.9
273	-150.0	250.0	-129.4	124.3	-130.7	174.7	24.7	27.9
274	-100.0	250.0	86.1	154.9	25.1	50.5	32.8	51.6
275	-100.0	250.0	46.1	105.7	35.5	96.2	-25.7	-23.5
276	-150.0	262.0	65.5	108.6	22.5	54.2	50.7	53.0
277	-91.0	249.0	74.6	113.8	53.0	82.6	35.2	36.8
278	-150.0	350.0	64.2	97.9	41.2	65.5	99.7	146.7
279	-150.0	234.0	-92.7	-90.8	-58.6	-49.2	34.5	35.9
280	-74.0	326.0	106.1	137.0	31.1	37.7	12.4	15.3
281	-95.0	241.0	98.8	151.5	13.1	25.3	62.0	67.2
282	-100.0	250.0	35.1	53.9	71.1	101.9	56.0	75.0
283	-20.0	181.0	67.9	73.3	56.1	65.7	44.1	39.7
284	-100.0	250.0	44.1	48.0	37.1	49.0	14.2	36.5
285	-150.0	467.0	27.8	43.3	18.0	41.2	26.5	55.9
286	-100.0	150.0	3.4	14.9	14.0	53.0	70.3	71.6
287	-100.0	150.0	70.0	70.9	52.0	58.9	77.9	78.8
288	-100.0	150.0	75.3	76.3	57.8	26.0	-8.2	12.4
289	-100.0	150.0	5.9	22.9	-2.8	20.5	18.6	22.9
290	-100.0	150.0	35.4	38.9	18.0	53.8	73.7	74.7
291	-100.0	150.0	71.2	72.5	52.5	16.4	1.7	30.7
292	-100.0	150.0	-12.3	-0.1	-10.3	18.5	32.3	36.2
293	-100.0	150.0	18.8	23.3	14.8	286.0	93.8	195.6
294	-100.0	300.0	105.2	333.2	64.5	194.4	69.6	97.6
295	-100.0	300.0	97.3	322.4	74.0	289.9	86.3	324.2
296	-100.0	300.0	92.2	237.7	88.4	318.7	122.0	318.8
297	-100.0	300.0	73.0	164.9	75.4	262.2	116.9	350.4
298	-100.0	300.0	60.3	86.9	68.1	175.0	167.5	113.4
299	-100.0	300.0	67.2	110.3	69.8	259.5	83.3	332.9
300	-100.0	300.0	59.0	85.4	64.3	257.1	237.2	237.2
301	-100.0	300.0	57.0	87.7	61.5	86.3	12.0	32.2
302	-100.0	300.0	67.7	168.6	65.7	83.3	116.9	116.9

Table 7. Calculated Min/Max Orbital Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		Beta Angle 52°		Beta Angle 0°		Beta Angle -52°	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
303	-100.0	300.0	70.2	281.9	63.2	292.4	74.2	164.1
304	-100.0	300.0	112.5	379.8	68.8	267.9	68.5	98.3
305	-100.0	300.0	100.8	268.9	67.5	148.7	76.5	118.2
306	-100.0	300.0	84.9	172.6	59.2	111.2	55.3	74.2
307	-100.0	300.0	72.3	159.4	60.4	144.9	57.4	76.0
308	-100.0	300.0	55.0	132.3	61.6	173.7	60.8	123.9
309	-100.0	300.0	51.5	88.2	65.6	162.0	76.6	159.3
310	-100.0	300.0	39.9	57.8	59.2	133.6	93.0	184.7
311	-100.0	300.0	29.5	71.4	49.2	124.5	90.8	183.6
312	-100.0	300.0	35.5	53.6	54.5	88.0	92.5	172.9
313	-100.0	300.0	42.3	61.4	58.4	118.0	79.8	155.2
314	-100.0	300.0	49.3	91.8	60.2	135.0	67.2	122.5
315	-100.0	300.0	65.9	133.4	65.7	141.1	64.2	89.5
316	-100.0	300.0	72.7	173.0	61.2	130.2	55.0	79.1
317	-100.0	300.0	82.5	166.8	61.1	127.1	53.4	95.2
318	30.0	120.0	51.3	52.0	81.0	81.2	71.6	71.6
319	30.0	120.0	50.5	50.8	75.0	75.1	93.7	93.9
320	30.0	120.0	50.4	50.6	72.3	72.4	94.5	94.7
321	30.0	120.0	51.3	52.0	82.6	82.7	74.8	74.8
322	30.0	120.0	51.2	51.8	82.8	82.9	72.3	72.3
323	30.0	120.0	50.3	50.4	73.3	73.4	87.6	87.7
324	30.0	120.0	50.1	50.2	69.5	69.6	89.0	89.2
325	30.0	120.0	51.1	51.6	83.0	83.1	75.4	75.4
326	10.0	130.0	55.1	57.4	52.4	61.6	115.1	153.6
327	30.0	120.0	65.9	69.2	68.8	76.4	96.9	102.1

Table 8. Calculated Min/Max Daily Averaged Temperatures.

Node Number	Allowable Temperature Limits		First Year 4/7/84 - 5/13/85		End of Mission 12/20/88 - 1/12/90	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
1	-100.0	250.0	48.10	109.40	58.00	115.30
2	-50.0	142.0	48.70	86.90	59.90	90.50
3	-16.0	147.0	62.80	92.70	77.10	93.50
4	-50.0	142.0	52.20	85.50	64.70	83.80
5	-100.0	250.0	52.40	127.70	62.00	124.60
6	-100.0	250.0	45.20	140.80	56.80	139.00
7	-100.0	250.0	48.70	115.20	60.00	111.80
8	-100.0	250.0	33.50	104.10	45.00	103.70
9	-1.0	149.0	52.80	83.20	65.00	80.00
10	-50.0	142.0	50.60	82.50	61.10	82.70
11	-100.0	250.0	61.20	120.80	67.80	127.30
12	-100.0	250.0	45.00	129.50	55.80	139.00
13	-100.0	250.0	43.80	124.00	51.40	132.40
14	-100.0	250.0	57.80	112.20	61.90	116.80
15	-18.0	154.0	63.60	95.60	75.20	95.50
16	-19.0	155.0	54.50	88.20	65.30	84.50
17	-50.0	142.0	40.70	85.70	50.90	81.90
18	-100.0	250.0	38.70	135.80	49.10	128.80
19	-50.0	142.0	37.90	90.10	48.10	85.50
20	-22.0	185.0	48.40	107.20	58.90	104.70
21	-14.0	153.0	52.90	81.60	64.20	78.80
22	-8.0	140.0	50.50	85.40	60.40	84.80
23	-100.0	250.0	52.40	114.20	58.60	121.40
24	-18.0	150.0	42.60	101.40	52.40	105.00
25	-250.0	228.0	32.50	113.90	38.60	122.80
26	-15.0	145.0	50.40	99.00	58.40	101.90
27	-16.0	150.0	58.20	89.10	69.80	87.90
28	-100.0	250.0	63.50	101.20	73.20	96.70
29	-50.0	142.0	39.50	83.30	49.40	79.80
30	-50.0	142.0	34.80	91.30	43.90	86.00
31	-100.0	250.0	41.40	133.20	50.00	126.90
32	-50.0	142.0	24.40	65.30	33.70	61.40
33	-16.0	150.0	57.30	87.00	67.60	82.10
34	-250.0	228.0	56.30	91.40	59.20	89.50
35	-50.0	142.0	38.90	80.90	48.40	83.00
36	-70.0	180.0	24.40	96.80	34.10	103.20
37	-50.0	142.0	33.20	81.30	41.80	81.30
38	-50.0	200.0	46.50	97.10	49.40	99.80
39	-12.0	157.0	51.10	78.20	61.70	75.20
40	3.0	139.0	49.30	83.40	58.40	78.10
41	-50.0	142.0	37.50	82.40	46.60	78.30
42	-10.0	148.0	37.70	131.00	44.70	123.20
43	-50.0	142.0	34.30	87.20	42.70	80.80
44	3.0	139.0	43.70	90.60	51.70	83.90
45	-12.0	157.0	51.20	79.30	60.50	74.50
46	-19.0	155.0	51.30	84.30	61.00	81.60
47	-50.0	142.0	36.70	77.40	44.90	75.40
48	-19.0	153.0	25.60	112.30	27.40	109.60
49	-100.0	250.0	38.30	116.40	45.20	123.00
50	-50.0	142.0	38.60	74.20	46.90	71.20

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year 4/7/84 - 5/13/85		End of Mission 12/20/88 - 1/12/90	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
51	-5.0	150.0	55.10	81.10	65.80	77.00
52	-100.0	250.0	58.50	97.10	64.30	91.20
53	-100.0	150.0	33.20	102.90	41.50	99.70
54	-53.0	144.0	24.10	108.10	32.70	104.90
55	-100.0	250.0	37.70	132.30	46.30	125.50
56	-50.0	250.0	48.90	96.40	57.10	89.40
57	-5.0	138.0	54.00	79.80	59.90	73.90
58	-50.0	142.0	41.40	71.60	50.60	67.60
59	-100.0	250.0	47.40	107.40	50.70	108.20
60	-12.0	142.0	-0.50	56.20	9.20	60.40
61	-100.0	250.0	44.40	124.00	49.70	123.90
62	0.0	90.0	38.80	74.90	46.50	71.30
63	-100.0	250.0	69.90	95.60	75.10	88.00
64	-50.0	142.0	48.20	77.90	58.60	74.00
65	-100.0	250.0	43.90	122.60	52.60	119.60
66	-16.0	142.0	3.80	81.20	14.60	86.80
67	-100.0	250.0	37.80	130.90	47.20	128.40
68	-2.0	138.0	37.30	88.90	44.50	83.30
69	-14.0	150.0	59.70	86.10	68.40	79.40
70	-100.0	250.0	67.50	102.10	69.20	97.00
71	-100.0	250.0	57.10	116.30	53.60	113.10
72	-1.0	112.0	52.40	100.70	61.70	98.10
73	-100.0	250.0	58.70	100.90	72.40	100.30
74	-10.0	143.0	44.50	81.80	54.20	78.70
75	-100.0	250.0	61.50	99.40	75.90	99.00
77	-150.0	300.0	52.60	82.50	63.90	84.20
79	-10.0	150.0	53.30	88.90	64.40	91.50
80	-22.0	185.0	48.30	80.90	59.10	83.70
81	-4.0	104.0	53.80	88.90	62.40	89.70
82	-13.0	154.0	77.10	99.40	77.60	94.80
83	-10.0	146.0	52.80	85.70	59.80	81.80
84	-8.0	142.0	19.20	50.40	30.60	47.30
85	-100.0	250.0	73.70	103.30	87.20	104.80
86	-8.0	142.0	23.60	48.40	40.10	44.10
87	-50.0	200.0	83.30	113.10	91.90	100.70
88	-39.0	123.0	57.60	79.90	70.00	73.30
89	-39.0	123.0	54.40	84.30	64.20	77.70
90	28.0	196.0	59.60	85.80	67.00	82.10
91	-125.0	250.0	-92.10	155.20	-91.60	164.70
92	-100.0	54.0	-56.60	-26.40	-57.20	-22.40
93	-50.0	150.0	49.70	80.30	61.10	80.70
94	-100.0	54.0	-53.40	-31.10	-48.80	-31.70
95	-100.0	250.0	52.30	130.70	62.20	128.30
96	-100.0	250.0	44.90	144.00	56.50	142.90
97	-125.0	250.0	-98.80	122.90	-97.40	122.20
98	-90.0	245.0	32.90	104.10	44.30	103.80
99	-100.0	250.0	-31.00	0.50	-15.30	1.50
100	-100.0	54.0	-50.30	-32.20	-50.60	-32.10
101	-100.0	250.0	64.00	130.70	66.80	139.20
102	-100.0	250.0	44.60	132.50	55.90	143.60

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year 4/7/84 - 5/13/85		End of Mission 12/20/88 - 1/12/90	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
103	-100.0	250.0	44.40	129.00	51.90	139.10
104	-100.0	250.0	59.80	115.60	62.70	121.00
105	-25.0	230.0	98.60	156.30	99.20	158.00
106	-90.0	214.0	-50.50	30.80	-47.00	31.70
107	-100.0	54.0	-64.60	-20.60	-60.30	-22.10
108	-100.0	250.0	38.10	141.00	48.70	133.10
109	-100.0	54.0	-68.50	-13.20	-64.10	-14.90
110	-22.0	194.0	32.60	126.20	40.80	125.50
111	-68.0	111.0	3.90	50.30	12.00	50.40
112	-117.0	124.0	-60.50	-19.10	-61.00	-18.90
113	-100.0	250.0	53.80	118.10	58.50	126.80
114	-96.0	185.0	-64.70	104.60	-64.30	118.00
115	-150.0	250.0	27.70	115.90	31.60	122.60
116	38.0	173.0	51.40	117.80	49.50	125.40
117	-47.0	181.0	47.40	91.20	51.10	96.50
118	-100.0	250.0	65.70	103.90	74.60	99.70
119	-100.0	54.0	-65.20	-21.60	-61.10	-22.90
120	-100.0	54.0	-70.70	-11.40	-66.60	-13.40
121	-100.0	250.0	41.30	138.60	50.10	133.80
122	-100.0	54.0	-12.30	20.40	-5.80	17.90
123	-47.0	181.0	36.20	90.80	51.20	95.50
124	-150.0	250.0	54.90	88.30	53.20	86.30
125	-100.0	54.0	-62.30	-26.00	-62.80	-21.40
126	-68.0	143.0	-35.70	86.50	-31.00	96.20
127	-100.0	54.0	-68.80	-20.50	-67.10	-16.40
128	-100.0	250.0	47.00	98.80	49.10	101.80
129	-93.0	245.0	19.60	56.00	19.00	55.40
130	-100.0	250.0	-30.50	29.50	-25.20	29.50
131	-100.0	54.0	-67.30	-21.90	-63.50	-23.50
132	-100.0	250.0	37.00	136.90	43.70	128.50
133	-100.0	54.0	-70.40	-14.30	-66.80	-16.70
134	-100.0	250.0	-52.00	53.60	-48.70	53.50
135	-93.0	145.0	12.80	56.50	18.70	55.60
136	-90.0	214.0	-47.80	31.50	-47.50	31.80
137	-100.0	54.0	-63.20	-27.80	-64.40	-24.40
138	-40.0	181.0	23.10	117.10	19.90	109.10
139	-100.0	250.0	38.70	120.90	45.90	129.60
140	-100.0	54.0	-60.50	-31.60	-62.50	-30.30
141	-196.0	225.0	32.20	73.80	31.70	73.30
142	-100.0	250.0	59.80	99.70	64.40	93.80
143	-99.0	150.0	18.60	105.40	26.40	103.50
144	-56.0	177.0	-8.80	125.00	-1.90	125.10
145	-100.0	250.0	37.70	139.30	46.20	131.90
146	-100.0	311.0	40.10	108.20	43.30	101.30
147	-87.0	194.0	18.60	62.40	13.00	56.40
148	-100.0	54.0	-54.00	-36.80	-55.60	-38.40
149	-100.0	250.0	48.40	110.60	50.70	113.10
150	-100.0	94.0	-19.90	40.20	-11.30	47.10
151	-100.0	250.0	44.20	129.20	49.60	129.80
152	-50.0	100.0	-41.80	-13.90	-43.80	-13.60

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year		End of Mission	
	Tmin-°F	Tmax-°F	4/7/84 - 5/13/85		Tmin-°F	Tmax-°F
			Tmin-°F	Tmax-°F		
153	-100.0	250.0	72.60	98.40	77.10	91.30
154	-100.0	54.0	-58.30	-34.30	-55.10	-35.90
155	-100.0	250.0	43.80	127.30	52.70	124.70
156	-100.0	100.0	-10.60	76.00	0.50	88.40
157	-100.0	250.0	37.20	135.90	46.60	134.40
158	-69.0	178.0	-49.90	51.30	-45.60	52.70
159	-100.0	100.0	-103.30	-64.20	-91.20	-63.50
160	-100.0	250.0	69.80	104.80	70.20	100.00
161	-100.0	250.0	58.40	120.10	53.20	116.80
162	-50.0	150.0	-71.00	81.10	-62.40	111.10
163	10.0	130.0	41.00	111.70	50.80	118.10
164	10.0	130.0	48.20	109.70	56.80	115.90
165	10.0	130.0	58.30	100.10	69.00	102.70
166	10.0	130.0	61.30	90.20	73.80	86.90
167	10.0	130.0	54.90	99.40	66.10	96.70
168	10.0	130.0	44.10	118.70	54.30	114.50
169	10.0	130.0	43.10	123.90	53.00	118.20
170	10.0	130.0	45.50	109.80	55.80	105.00
171	10.0	130.0	53.20	94.00	64.10	90.20
172	10.0	130.0	56.90	85.10	67.40	83.20
173	10.0	130.0	54.00	99.50	62.50	100.50
174	10.0	130.0	45.50	108.70	55.50	113.60
175	10.0	130.0	52.10	129.80	61.90	138.80
176	10.0	130.0	54.80	115.30	64.20	123.20
177	10.0	130.0	70.00	109.60	79.50	114.20
178	10.0	130.0	74.30	101.00	89.50	100.30
179	10.0	130.0	60.00	119.90	71.40	119.60
180	10.0	130.0	55.10	141.30	66.40	139.30
181	10.0	130.0	52.00	141.50	63.60	138.80
182	10.0	130.0	51.00	122.60	62.30	120.10
183	10.0	130.0	58.60	111.00	70.00	109.10
184	10.0	130.0	72.20	98.00	83.50	95.90
185	10.0	130.0	63.80	116.30	70.60	120.80
186	10.0	130.0	58.20	131.90	66.80	140.20
187	10.0	130.0	57.40	123.80	61.50	121.30
188	10.0	130.0	52.50	109.30	56.40	107.00
189	10.0	130.0	66.00	97.50	68.00	90.20
190	10.0	130.0	73.00	93.40	81.30	87.20
191	10.0	130.0	54.20	111.40	62.20	107.30
192	10.0	130.0	45.70	121.00	53.80	119.00
193	10.0	130.0	42.90	124.40	50.70	121.90
194	10.0	130.0	44.30	115.70	51.70	109.90
195	10.0	130.0	59.00	97.20	64.90	89.60
196	10.0	130.0	72.50	96.30	77.90	85.80
197	10.0	130.0	67.40	112.10	64.50	105.20
198	10.0	130.0	62.50	119.70	62.80	115.50
199	30.0	120.0	52.40	81.10	63.50	82.60
200	30.0	120.0	55.50	95.90	66.20	99.10
201	30.0	120.0	60.40	101.60	73.30	100.30
202	30.0	120.0	57.30	104.10	69.50	102.50

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year		End of Mission	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
203	30.0	120.0	56.90	95.00	68.20	98.00
204	-100.0	300.0	121.90	140.40	134.20	145.30
205	-100.0	300.0	103.40	172.20	119.50	177.30
206	-100.0	300.0	117.00	137.90	130.40	140.40
207	-100.0	300.0	107.60	163.30	116.90	174.20
208	30.0	115.0	69.90	92.30	80.20	83.80
209	30.0	115.0	63.80	96.20	71.60	90.60
210	30.0	115.0	63.60	92.80	74.30	90.50
211	30.0	115.0	50.60	89.00	59.00	84.90
212	30.0	115.0	67.40	95.70	72.60	88.40
213	-100.0	300.0	85.40	113.30	87.80	103.90
214	-100.0	300.0	63.40	116.20	70.30	112.50
215	-100.0	300.0	80.20	113.40	84.60	100.00
216	-100.0	300.0	88.20	124.40	79.50	112.10
217	20.0	120.0	49.60	89.00	60.20	89.20
218	20.0	120.0	51.80	89.90	62.20	85.40
219	20.0	120.0	49.80	92.10	59.50	86.70
220	20.0	120.0	50.20	85.70	60.20	84.60
221	10.0	130.0	41.40	115.60	49.60	120.30
222	10.0	130.0	52.40	105.20	61.30	110.10
223	10.0	130.0	58.30	88.70	71.80	89.10
224	10.0	130.0	59.80	99.50	71.10	95.40
225	10.0	130.0	50.40	116.20	61.00	113.70
226	10.0	130.0	44.10	131.20	53.50	122.10
227	10.0	130.0	44.10	127.90	52.40	117.00
228	10.0	130.0	49.80	106.90	57.10	96.80
229	10.0	130.0	57.70	88.50	66.60	82.10
230	10.0	130.0	57.90	95.60	67.40	93.90
231	10.0	130.0	49.20	107.40	56.80	107.90
232	10.0	130.0	37.50	114.60	45.40	115.90
233	25.0	105.0	57.70	89.20	68.60	86.70
234	20.0	110.0	53.40	85.70	63.70	81.20
235	20.0	110.0	53.50	85.40	63.80	80.90
236	0.0	120.0	52.50	86.10	63.60	85.00
237	0.0	130.0	49.90	92.70	59.90	87.90
238	-100.0	150.0	42.00	63.80	51.50	65.60
239	-100.0	150.0	41.70	66.30	48.00	62.00
240	10.0	130.0	35.40	106.50	43.40	108.80
241	10.0	130.0	43.10	100.70	50.90	101.90
242	10.0	130.0	52.80	86.70	62.40	84.00
243	10.0	130.0	58.70	83.70	68.80	78.60
244	10.0	130.0	49.40	97.30	58.00	93.40
245	10.0	130.0	38.20	111.30	47.50	107.80
246	10.0	130.0	36.00	118.20	45.20	113.40
247	10.0	130.0	43.80	107.60	52.40	100.90
248	10.0	130.0	51.80	91.50	60.30	84.90
249	10.0	130.0	56.80	83.40	66.20	77.60
250	10.0	130.0	52.00	95.80	59.20	93.80
251	10.0	130.0	39.90	102.30	47.00	102.00
252	2.0	82.0	46.90	61.70	42.70	56.90

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year 4/7/84 - 5/13/85		End of Mission 12/20/88 - 1/12/90	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
253	-100.0	250.0	61.20	102.90	75.60	102.10
254	-100.0	91.0	18.90	40.80	25.80	39.20
255	-100.0	250.0	63.90	101.60	79.10	101.00
256	-100.0	250.0	54.60	83.80	66.60	81.80
257	-100.0	250.0	52.60	79.30	64.20	81.30
258	-100.0	250.0	53.40	79.90	65.30	81.20
259	-100.0	200.0	23.20	33.40	24.10	33.50
260	-150.0	217.0	39.40	65.70	48.90	68.00
261	-62.0	147.0	-23.10	30.10	-16.20	30.00
262	-150.0	467.0	82.90	123.80	86.20	123.80
263	-100.0	250.0	39.80	94.30	44.90	94.40
264	-100.0	99.0	3.30	33.80	15.60	31.10
265	-100.0	250.0	84.10	116.80	97.20	117.30
266	-100.0	99.0	8.60	35.10	25.80	32.90
267	-100.0	200.0	83.70	114.20	92.30	101.60
268	-44.0	78.0	-54.90	-10.70	-40.40	-10.40
269	-44.0	78.0	-53.30	-11.20	-42.40	-11.10
270	-20.0	130.0	45.80	134.10	54.80	125.20
271	-66.0	268.0	24.30	176.40	27.40	194.50
272	-66.0	268.0	47.20	119.20	58.60	116.20
273	-150.0	250.0	-43.60	10.50	-42.00	11.40
274	-100.0	250.0	15.40	119.50	16.50	126.30
275	-100.0	250.0	43.30	81.30	39.30	79.90
276	-150.0	262.0	-22.90	83.90	-24.50	95.70
277	-91.0	249.0	45.90	97.30	47.80	100.30
278	-150.0	350.0	34.60	84.00	33.20	87.70
279	-150.0	234.0	-91.00	121.90	-93.80	117.40
280	-74.0	326.0	15.40	124.70	17.40	127.90
281	-95.0	241.0	-2.30	132.60	-0.90	136.00
282	-100.0	250.0	46.90	88.30	52.40	86.20
283	-20.0	181.0	49.70	78.20	60.00	80.60
284	-100.0	250.0	31.70	52.20	39.80	53.90
285	-150.0	467.0	25.30	39.80	31.10	38.40
286	-100.0	150.0	24.40	43.30	27.90	40.70
287	-100.0	150.0	49.30	72.50	52.90	74.20
288	-100.0	150.0	54.30	78.80	57.70	79.10
289	-100.0	150.0	8.30	18.10	9.00	18.00
290	-100.0	150.0	19.70	35.30	20.90	35.80
291	-100.0	150.0	51.90	74.60	52.60	73.30
292	-100.0	150.0	8.00	18.00	9.00	18.20
293	-100.0	150.0	19.10	35.00	20.80	35.40
294	-100.0	300.0	78.20	250.50	84.80	269.20
295	-100.0	300.0	92.10	204.20	95.00	224.10
296	-100.0	300.0	138.50	169.70	144.60	177.10
297	-100.0	300.0	110.30	183.80	126.80	190.90
298	-100.0	300.0	71.50	241.60	87.60	248.10
299	-100.0	300.0	90.10	254.90	107.30	262.50
300	-100.0	300.0	70.40	263.60	86.30	270.30
301	-100.0	300.0	78.60	215.50	90.70	219.60
302	-100.0	300.0	125.50	168.00	139.40	171.70

Table 8. Calculated Min/Max Daily Averaged Temperatures. (Cont.)

Node Number	Allowable Temperature Limits		First Year 4/7/84 - 5/13/85		End of Mission 12/20/88 - 1/12/90	
	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F	Tmin-°F	Tmax-°F
303	-100.0	300.0	120.40	183.70	122.60	187.40
304	-100.0	300.0	82.20	268.60	87.60	291.90
305	-100.0	300.0	91.30	220.40	101.80	238.20
306	-100.0	300.0	57.80	139.70	56.60	137.80
307	-100.0	300.0	67.00	119.20	60.30	113.50
308	-100.0	300.0	87.60	110.60	81.40	100.40
309	-100.0	300.0	67.10	110.20	72.60	102.40
310	-100.0	300.0	48.80	136.80	56.30	140.00
311	-100.0	300.0	49.30	144.00	55.80	141.60
312	-100.0	300.0	44.50	146.70	51.60	141.60
313	-100.0	300.0	52.70	120.10	56.10	110.20
314	-100.0	300.0	75.40	109.30	77.90	95.50
315	-100.0	300.0	79.90	112.80	70.50	99.10
316	-100.0	300.0	66.00	136.90	58.00	132.20
317	-100.0	300.0	69.10	142.40	63.80	136.70
318	30.0	120.0	53.00	97.40	66.80	101.40
319	30.0	120.0	59.50	99.30	69.70	96.30
320	30.0	120.0	57.40	100.90	65.80	96.60
321	30.0	120.0	56.30	96.80	68.80	98.50
322	30.0	120.0	55.70	96.50	66.80	95.40
323	30.0	120.0	57.30	91.90	67.70	88.70
324	30.0	120.0	53.80	94.50	62.60	90.00
325	30.0	120.0	58.50	93.50	68.40	89.60
326	10.0	130.0	38.70	135.80	49.10	128.80
327	30.0	120.0	58.70	100.90	72.40	100.30

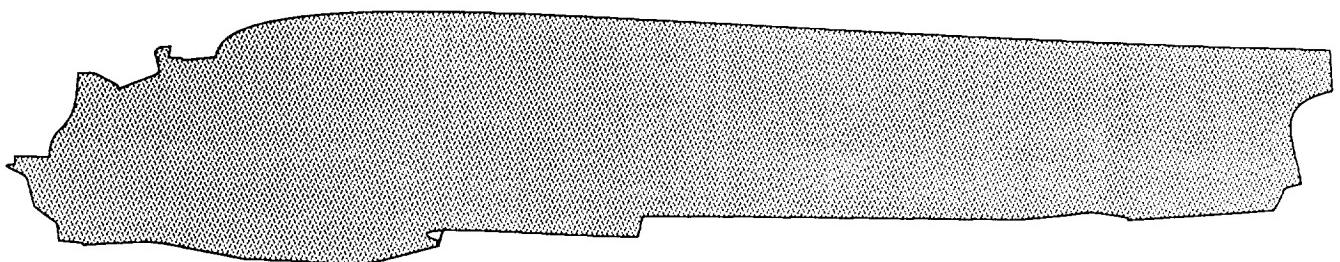
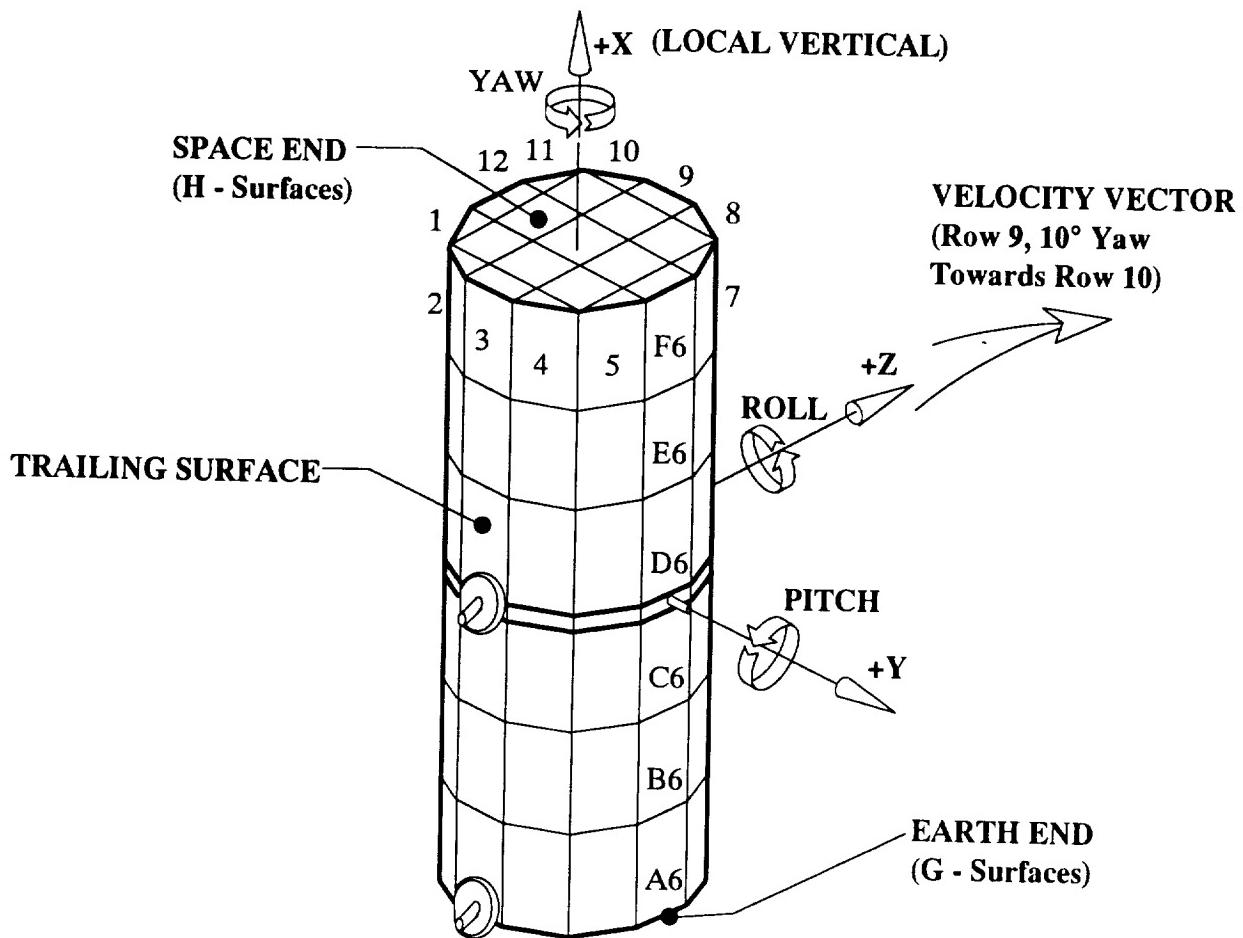


Fig. 1 LDEF in Free Flight

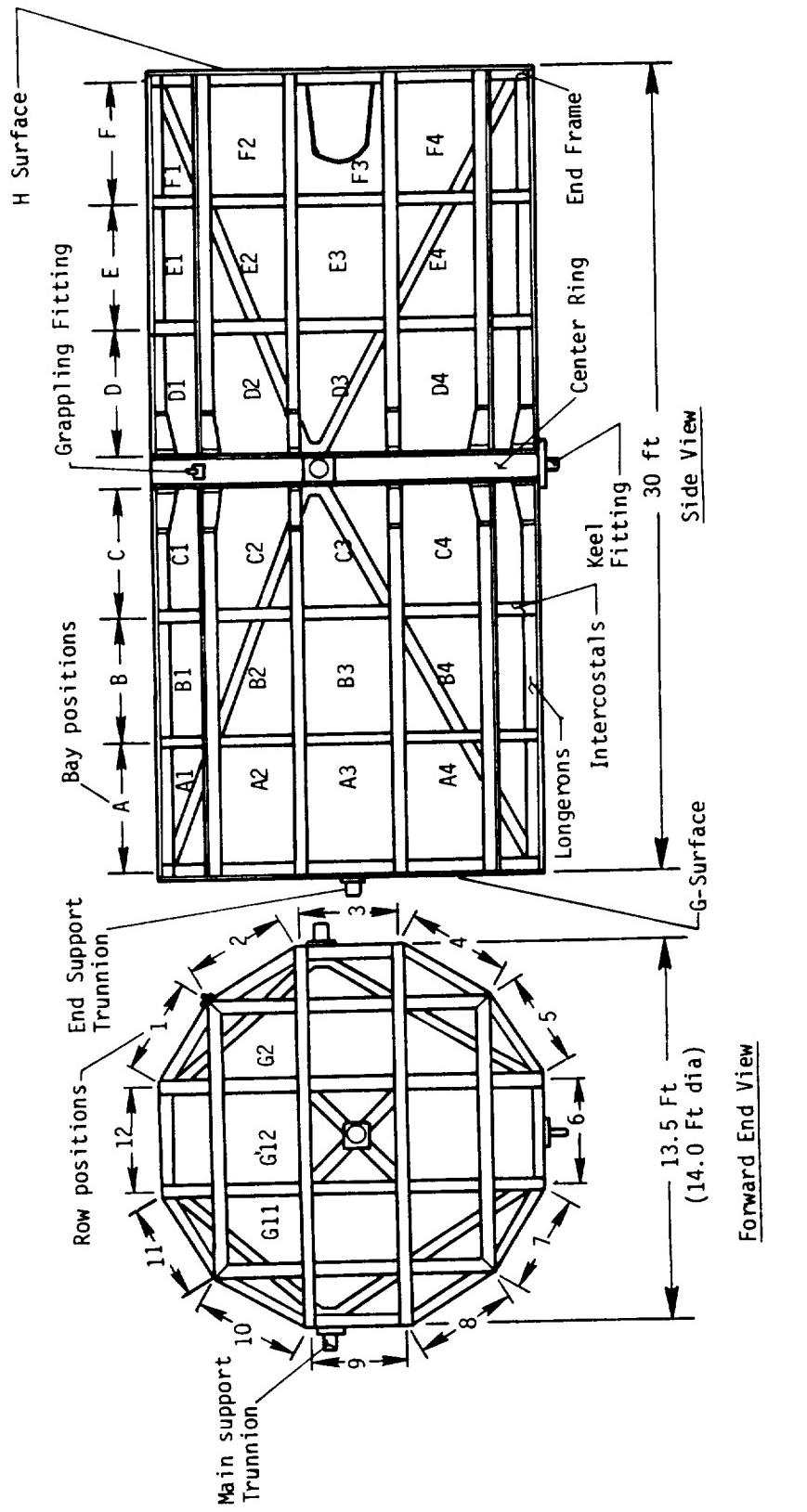


Fig. 2 LDEF Structure.

NOTE:

- 1- All tray sides 0.063 in.
6061-T6 Aluminum
(Chromic Anodize)
- 2- All dimensions are in inches

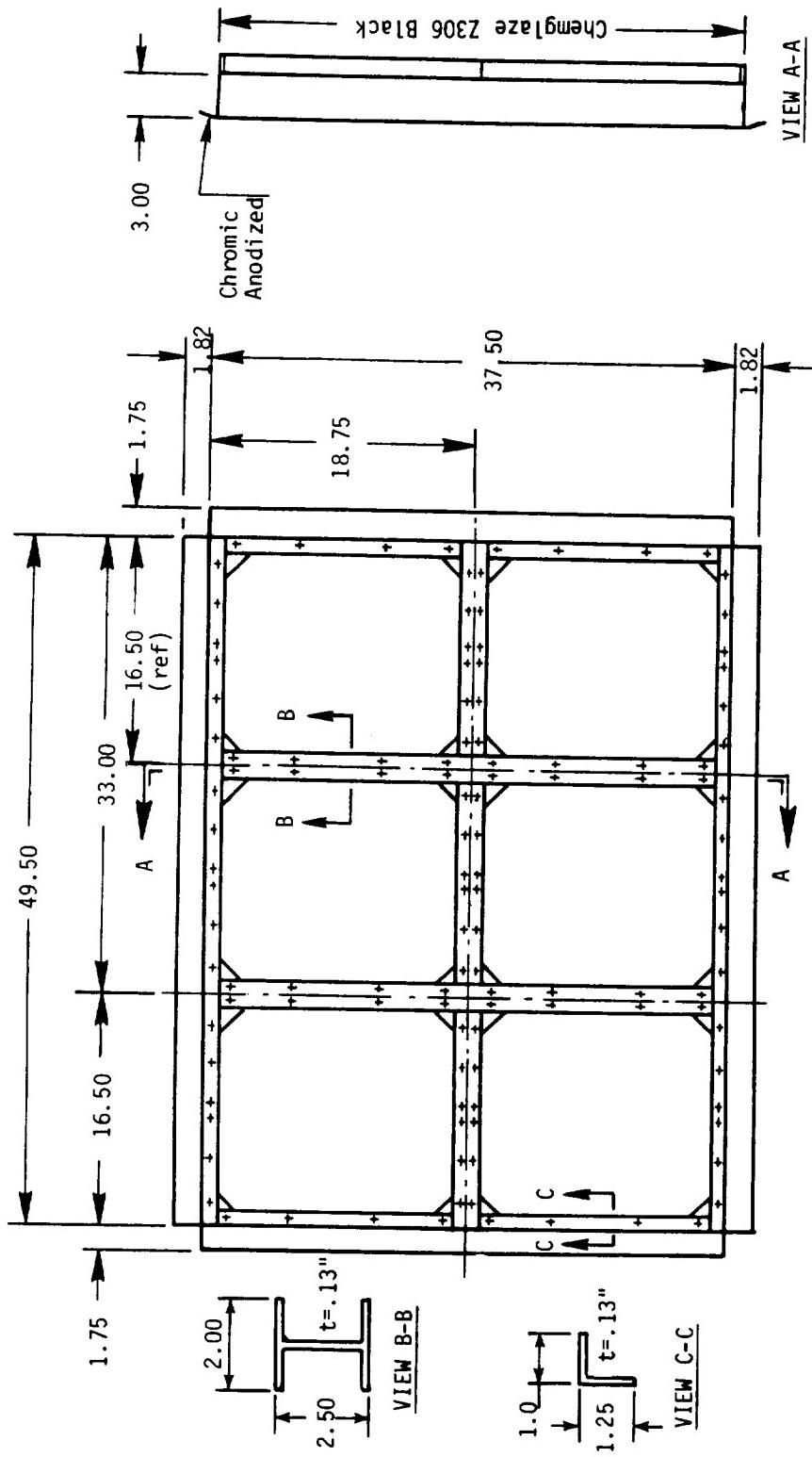
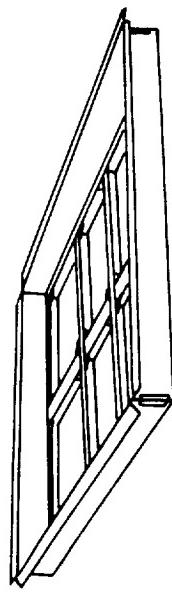


Fig. 3 LDEF Peripheral Tray Assembly - 3 Inch Tray

- NOTE:
- 1- All tray sides 0.125 in.
6061-T6 Aluminum
(Chromic Anodize)
 - 2- All dimensions are in inches

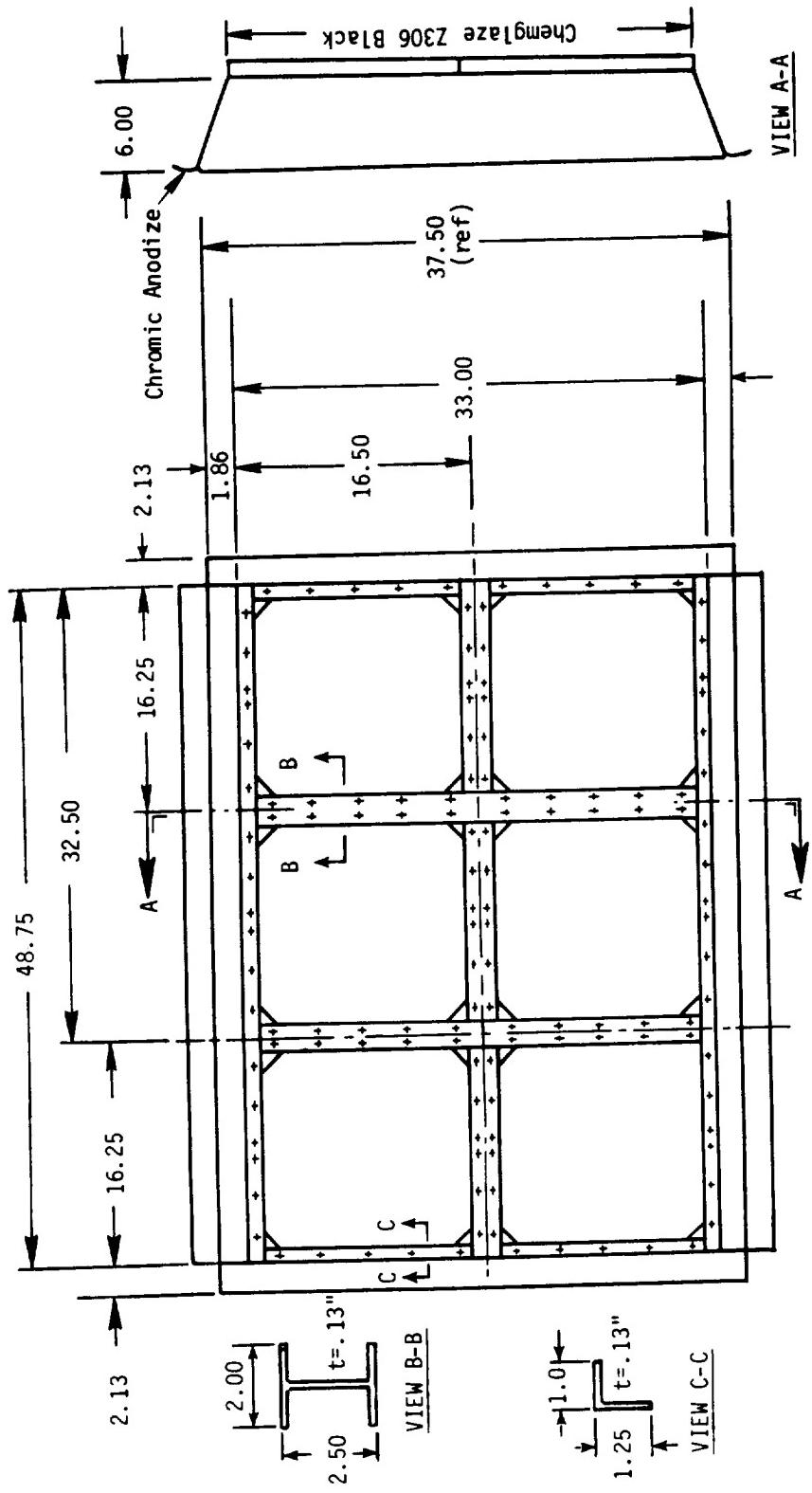
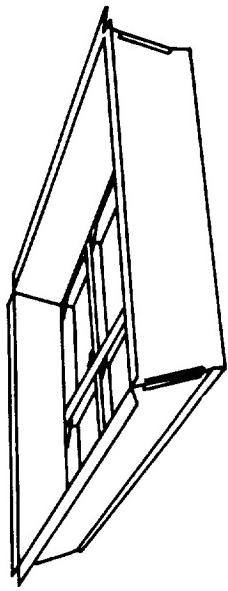


Fig. 4 LDEF Peripheral Tray Assembly - 6 Inch Tray

NOTE:

- 1- All tray sides 0.063 in.
6061-T6 Aluminum
(Chromic Anodize)

2- All dimensions are in inches

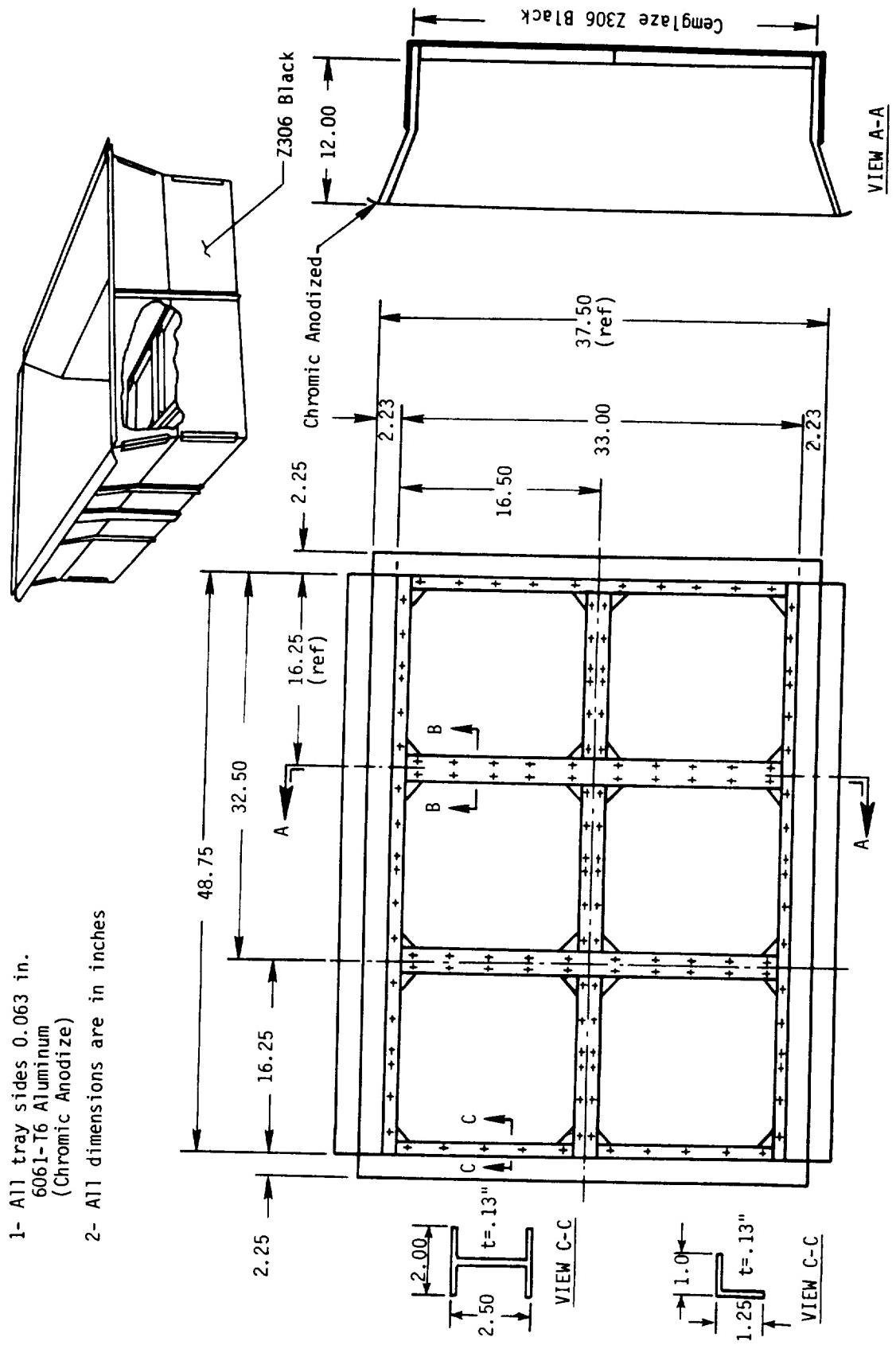


Fig. 5 LDEF Peripheral Tray Assembly - 12 Inch Tray

- NOTE:
1. All tray sides 0.125 in.
6061-T6 aluminum
(chromic anodize)
 2. All dimensions are in inches

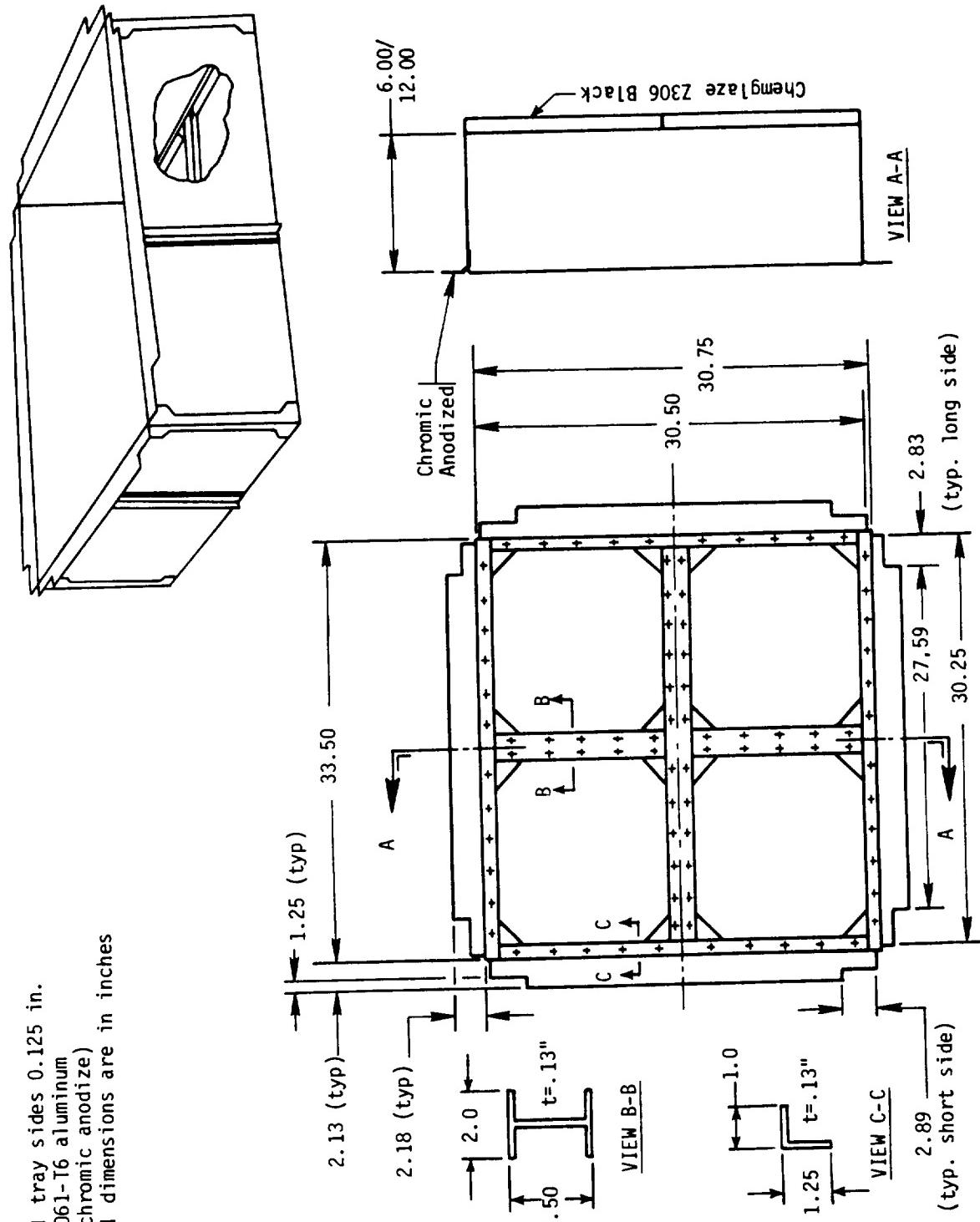


Fig. 6 LDEF End "Center" Tray - 6 & 12 Inch Deep

NOTE:

1-A11 tray sides 0.125 in.
6061-T6 aluminum
(chromic anodize)

2-A11 dimensions are in inches

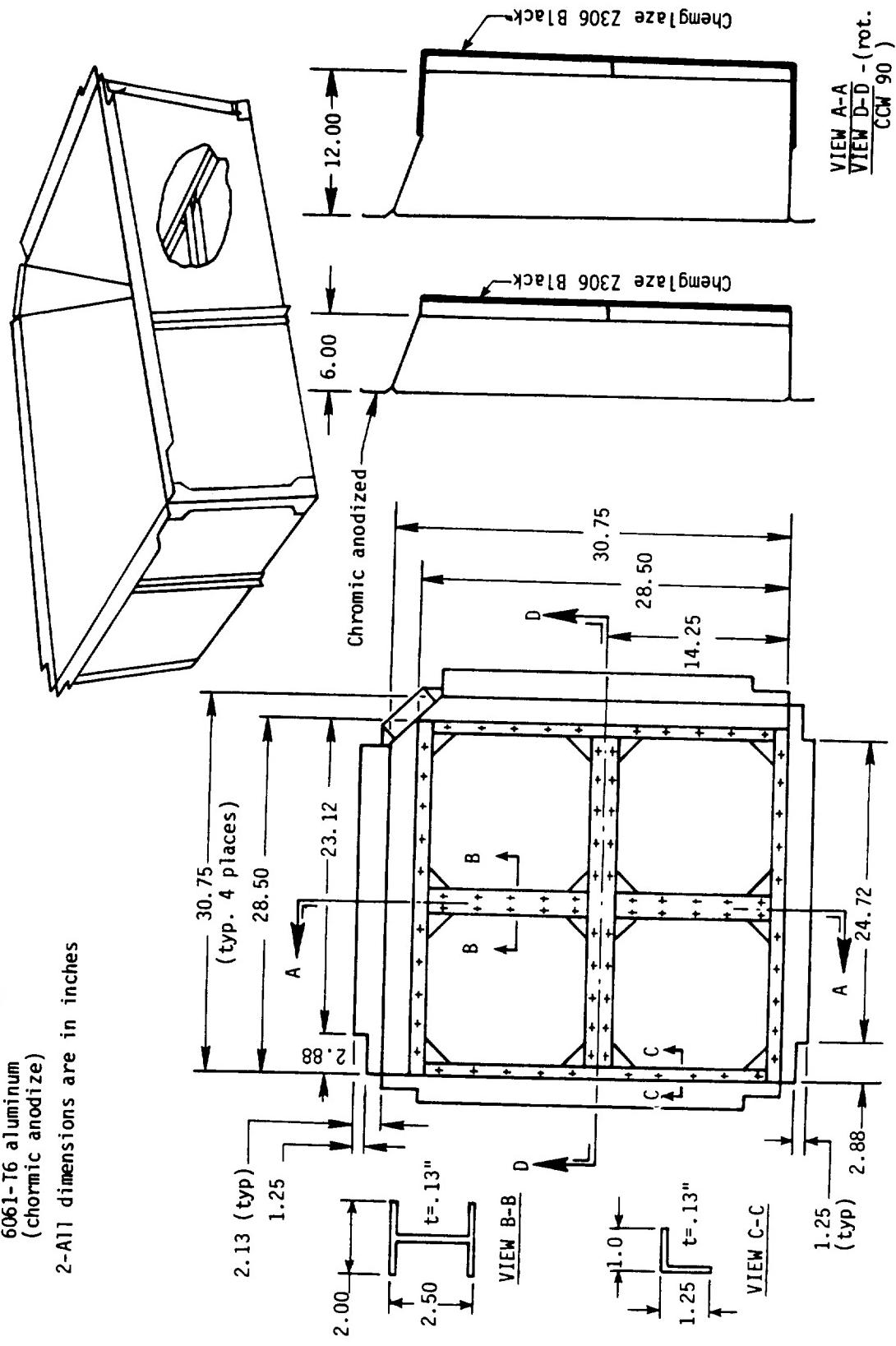


Fig. 7 LDEF End "Corner" - Tray 6 & 12 Inch Deep

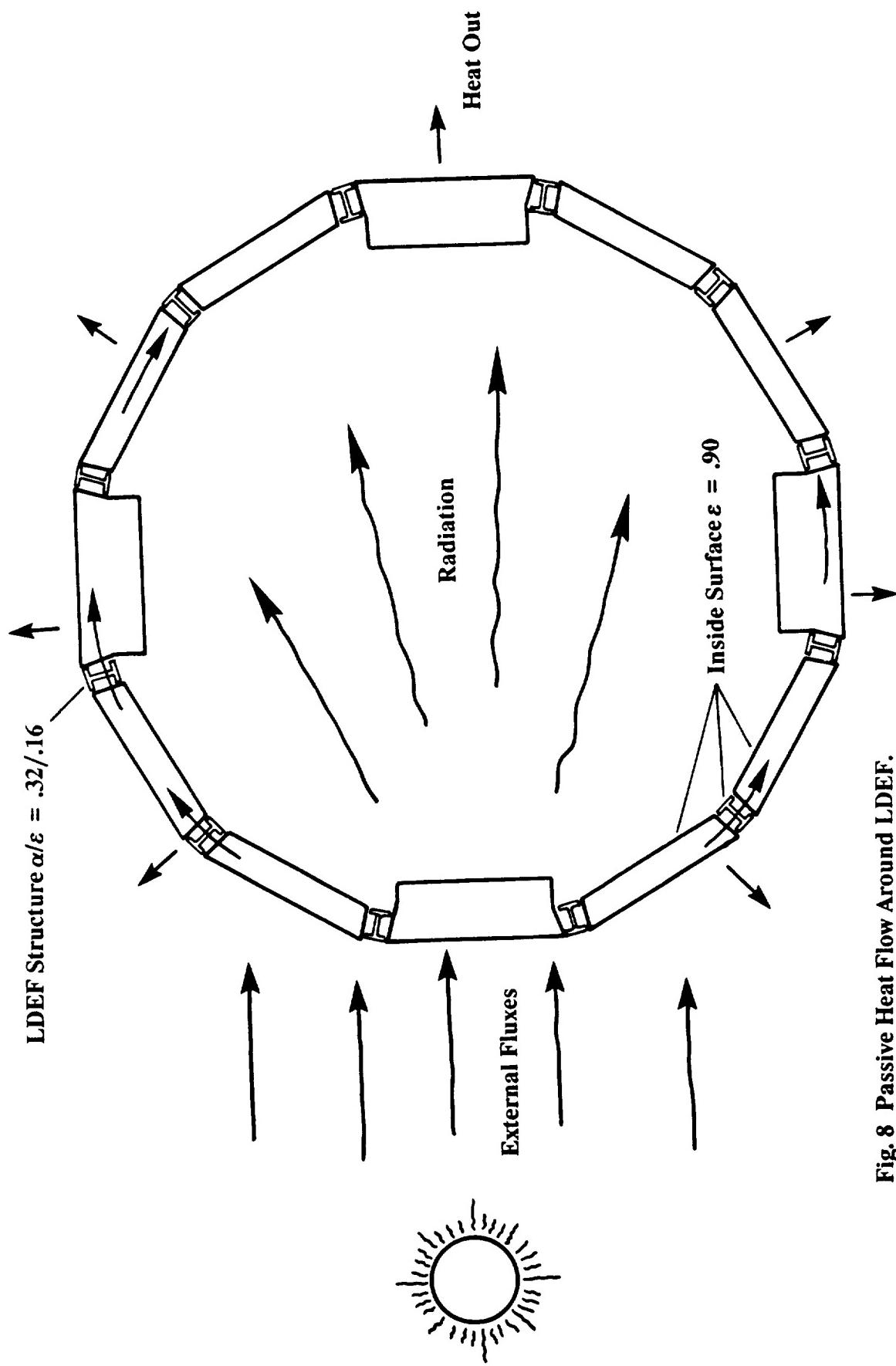


Fig. 8 Passive Heat Flow Around LDEF.

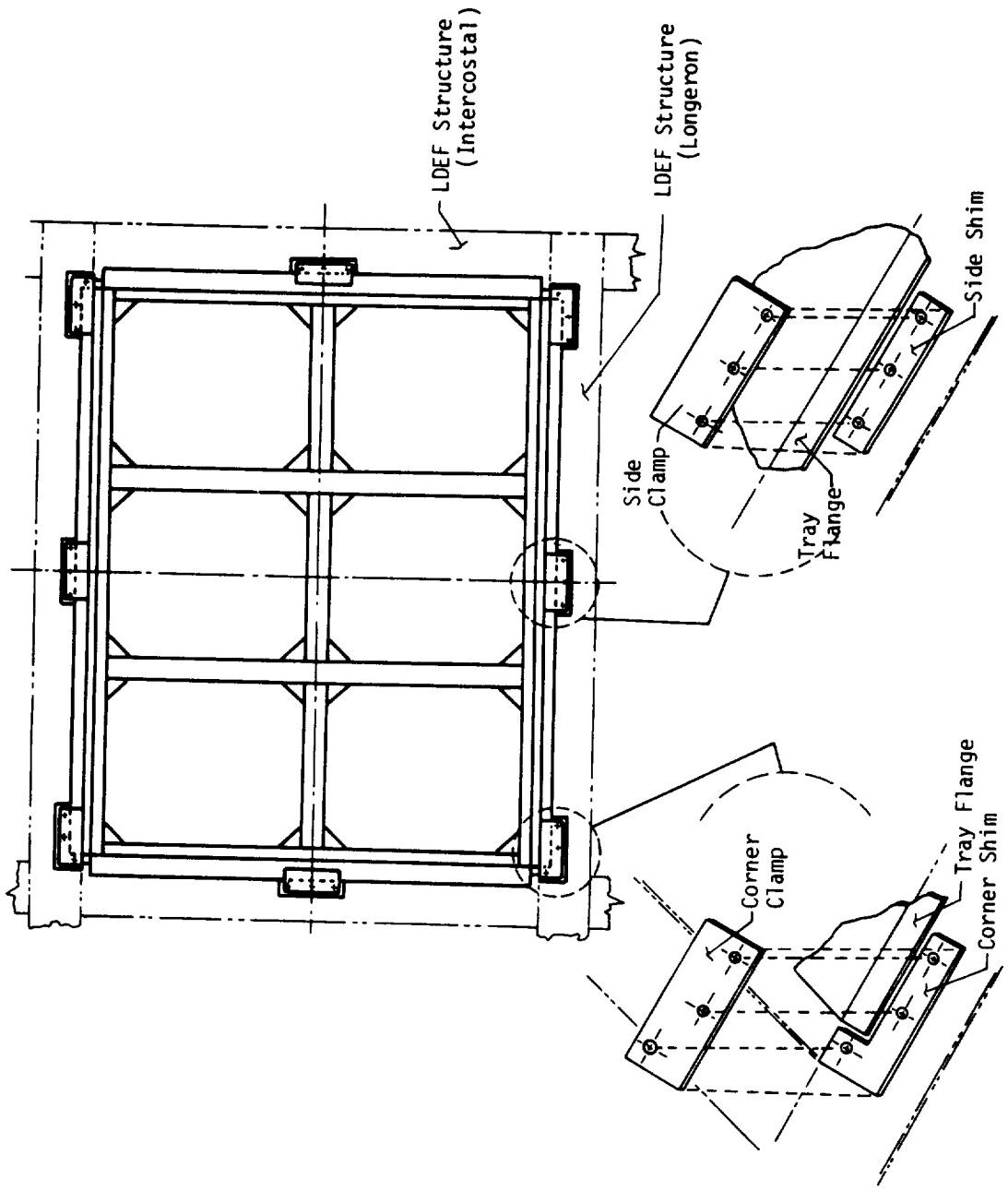
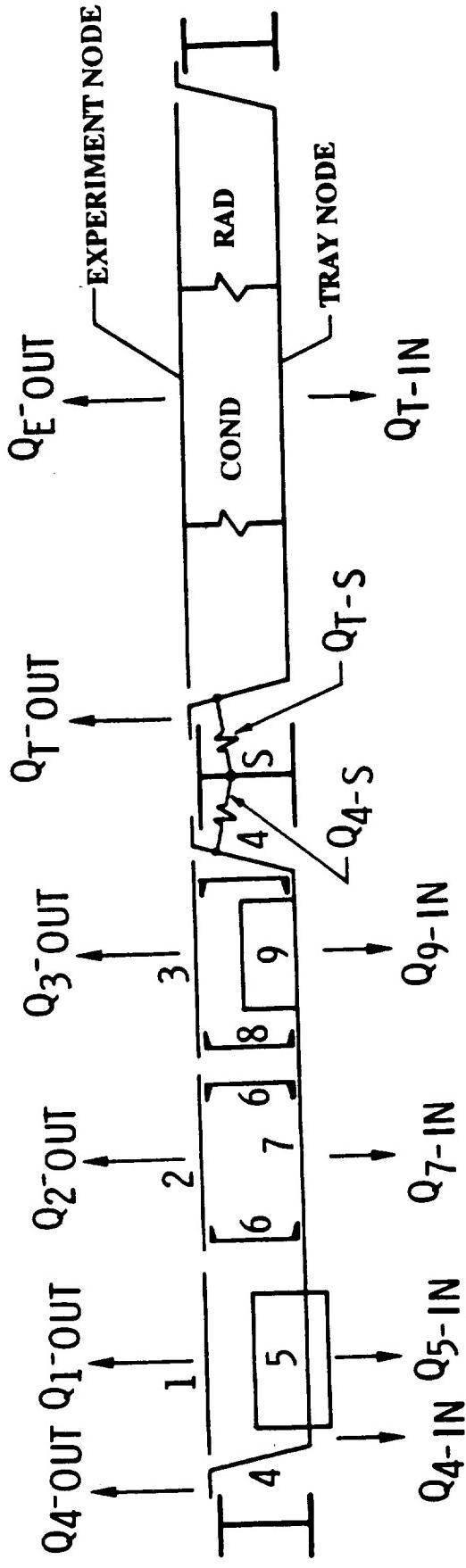


Fig. 9 Tray - Structure Interface

EXPERIMENTER'S
ORIGINAL MODEL



LDEF REDUCED
NODE MODEL

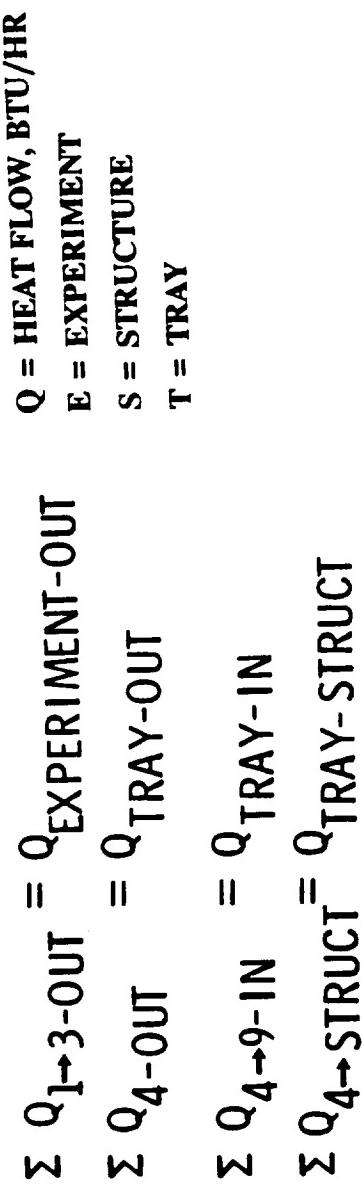


Fig. 10 Comparison of Original Thermal Model to the LDEF Reduced Model

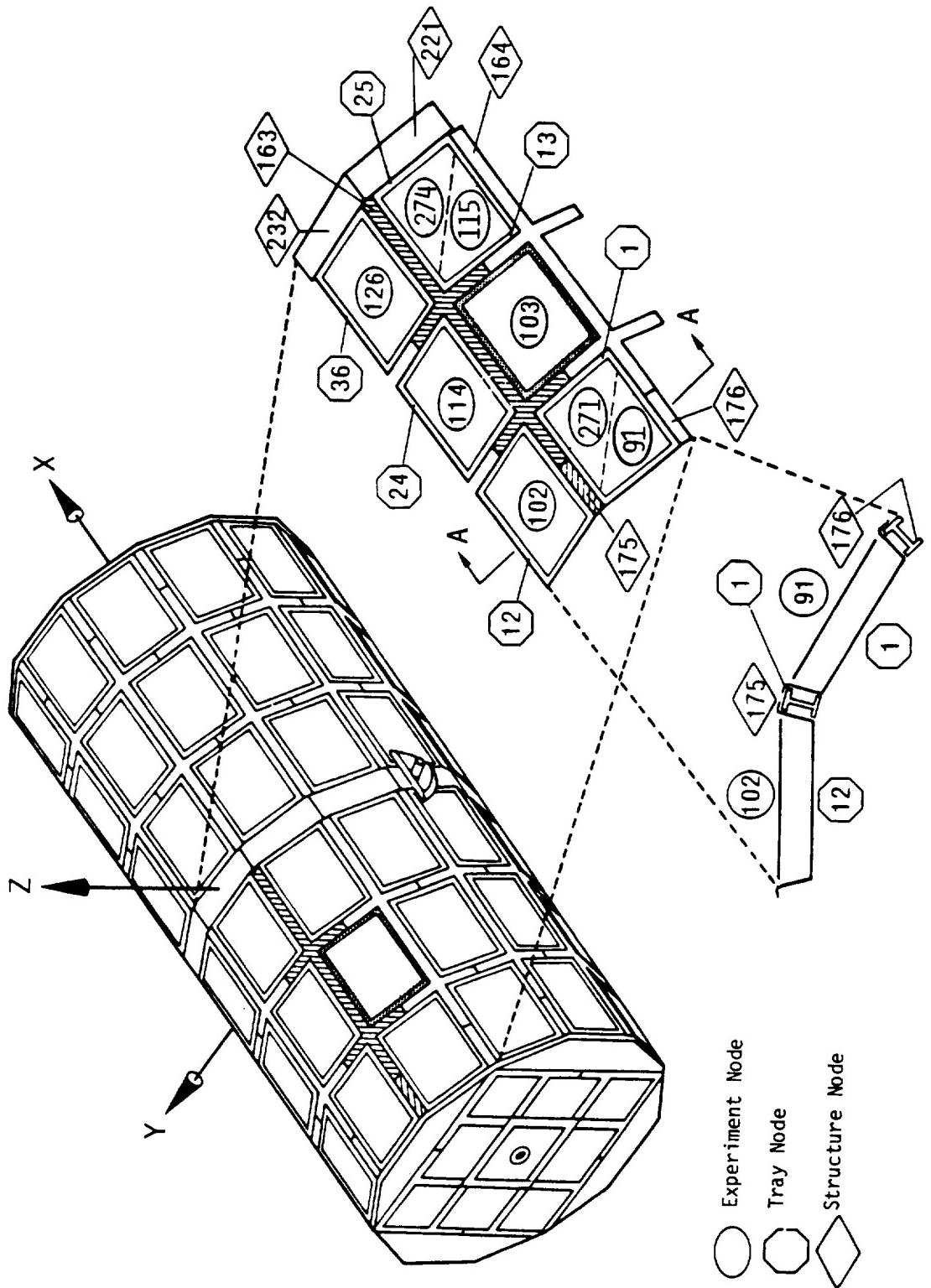


Fig. 11 Detail of Thermal Model Node Arrangement

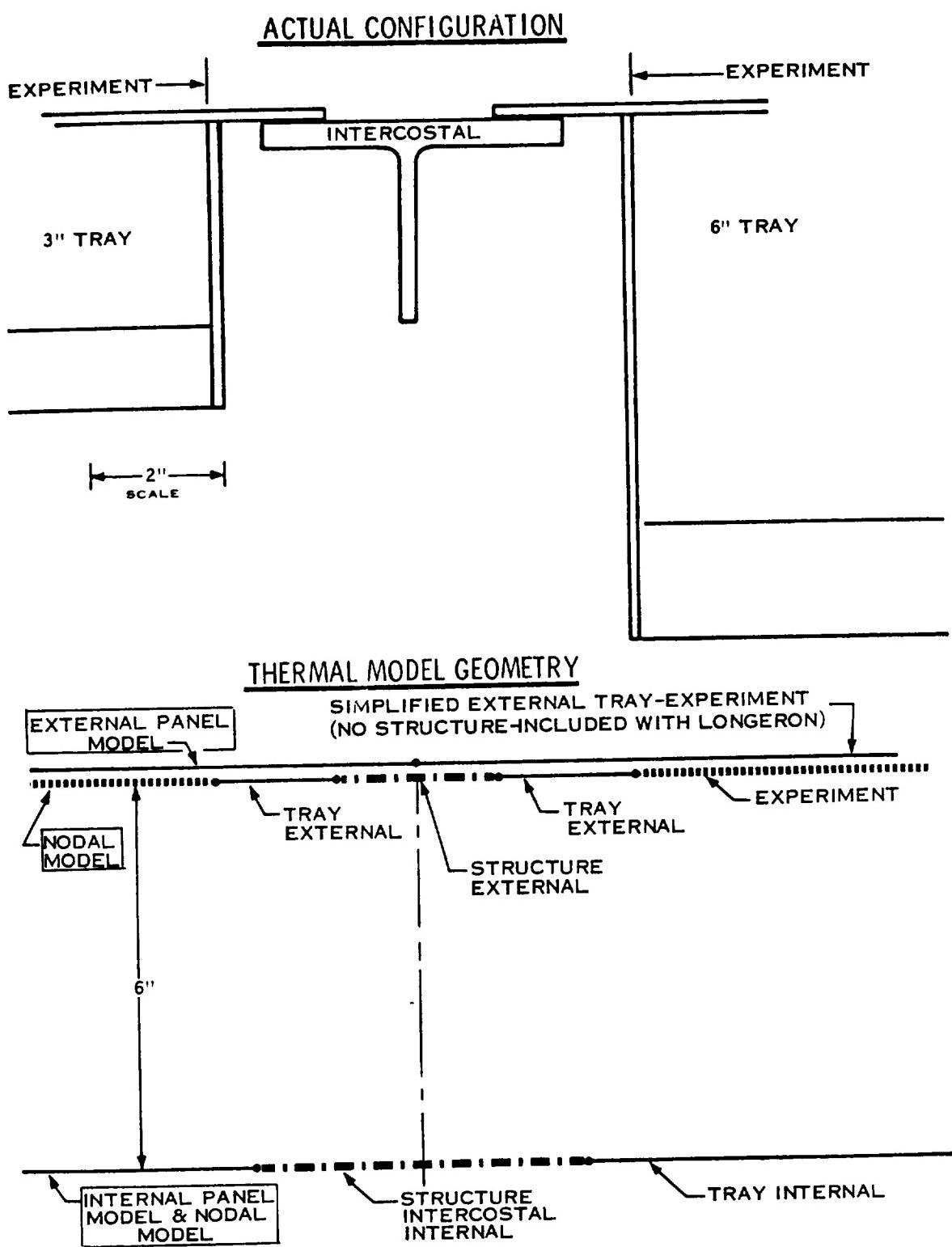


Fig. 12 Thermal Model Intercostal Configuration

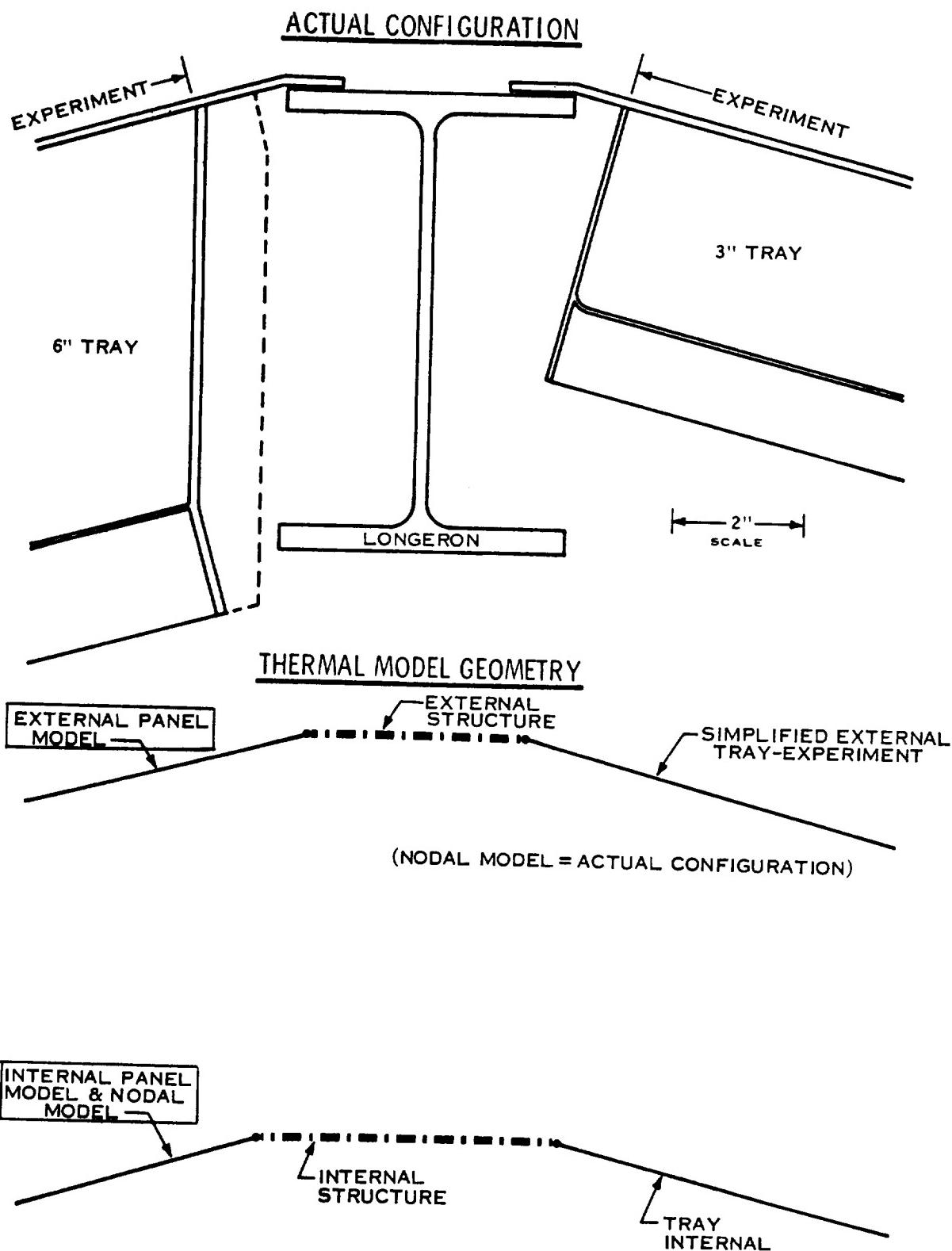


Fig. 13 Thermal Model Longeron Configuration

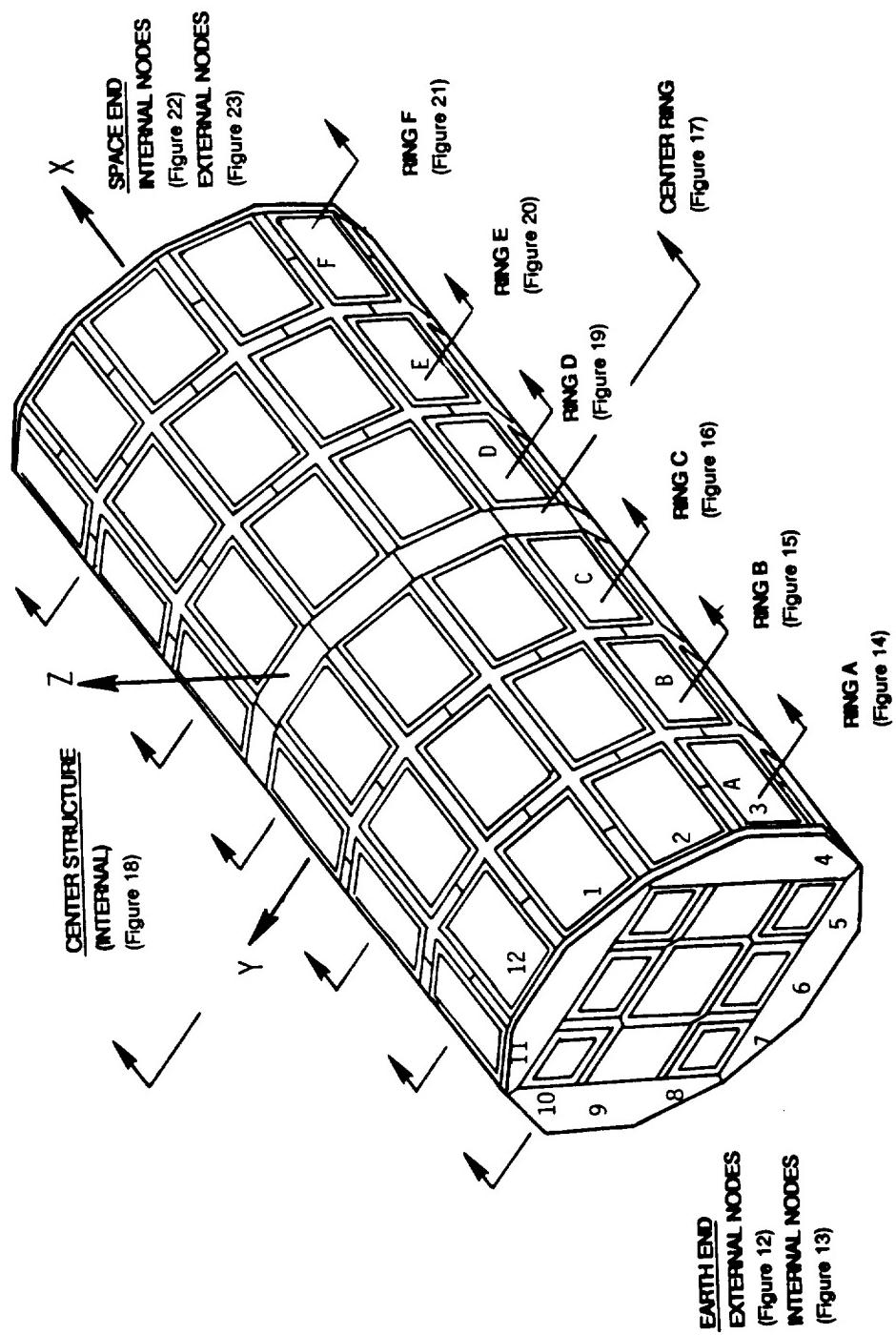


Fig. 14 LDEF Thermal Nodal Model

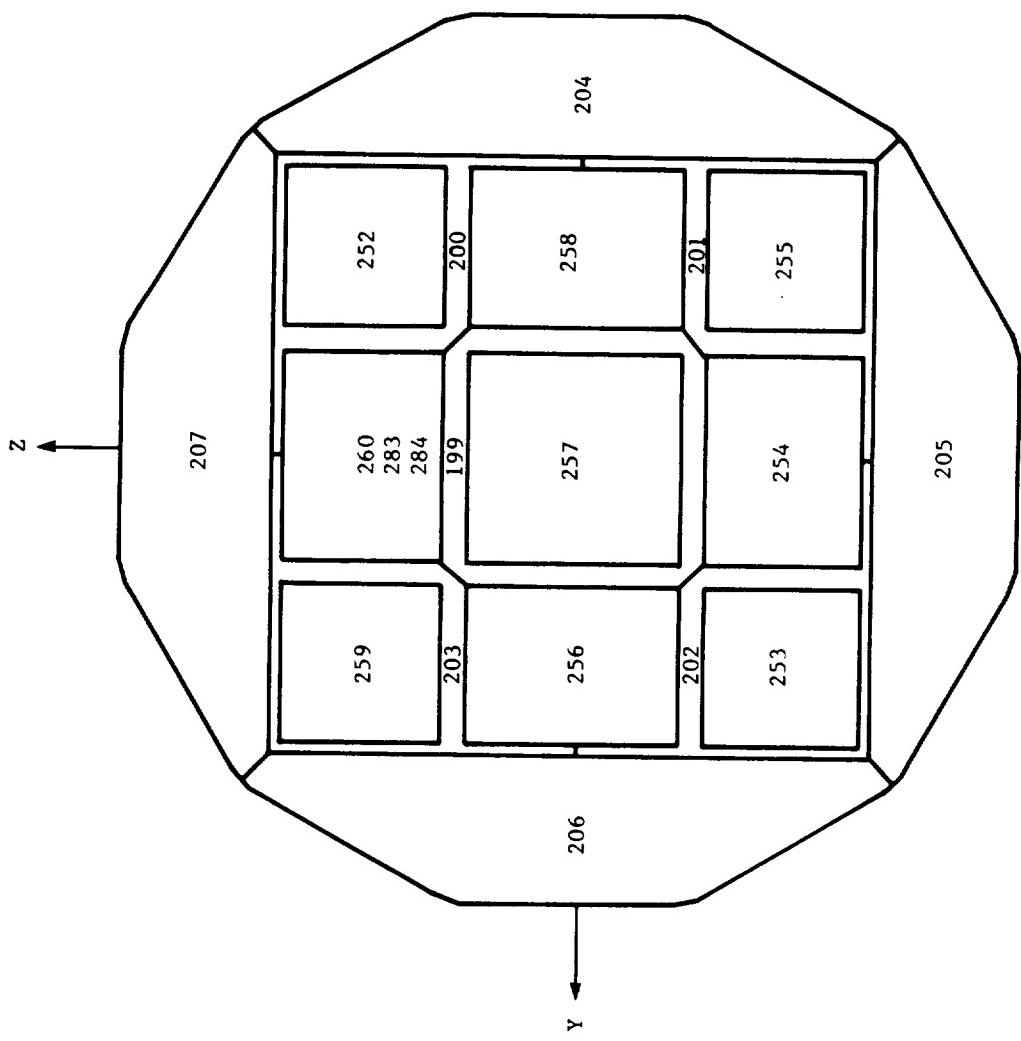


Fig. 15 LDEF Thermal Model, External Nodes - Earth End

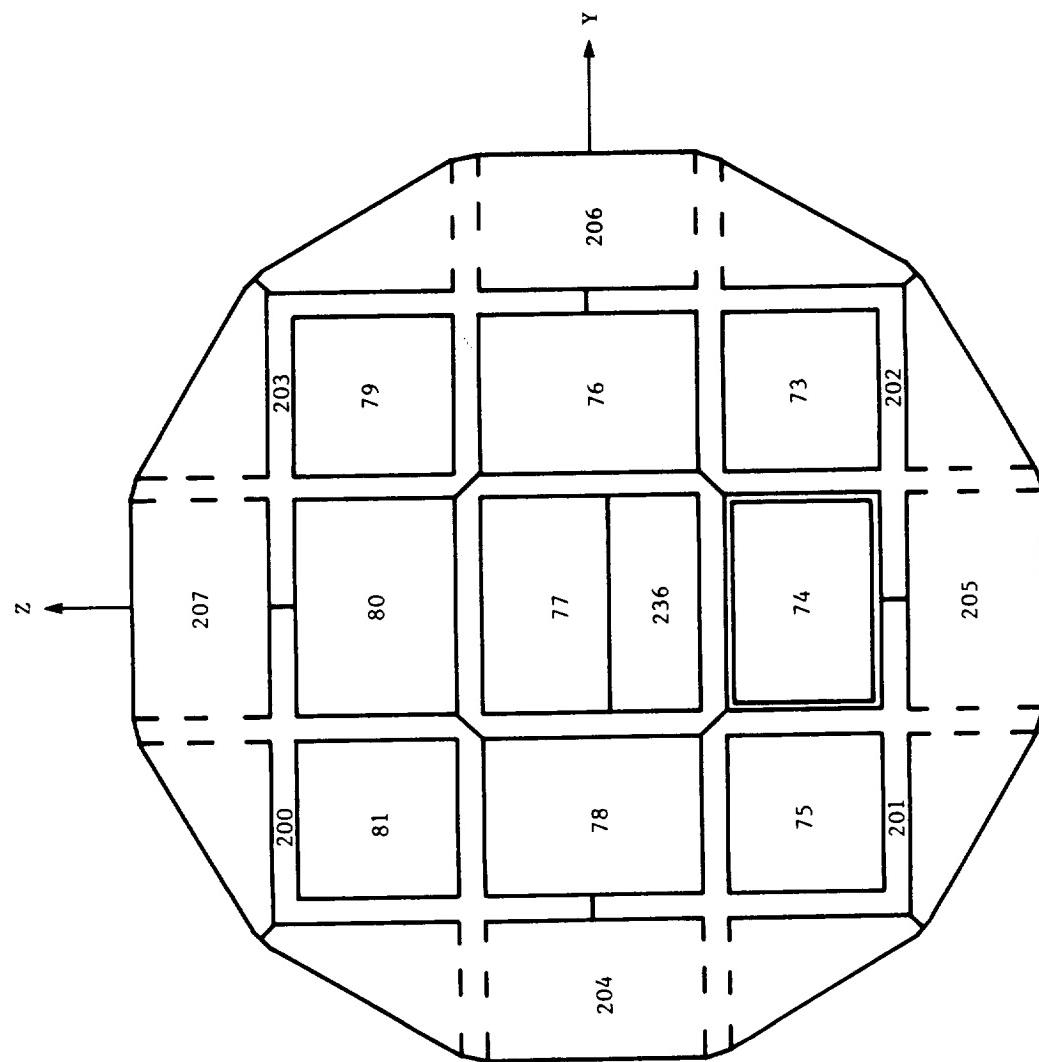


Fig. 16 LDEF Thermal Model, Internal Nodes - Earth End

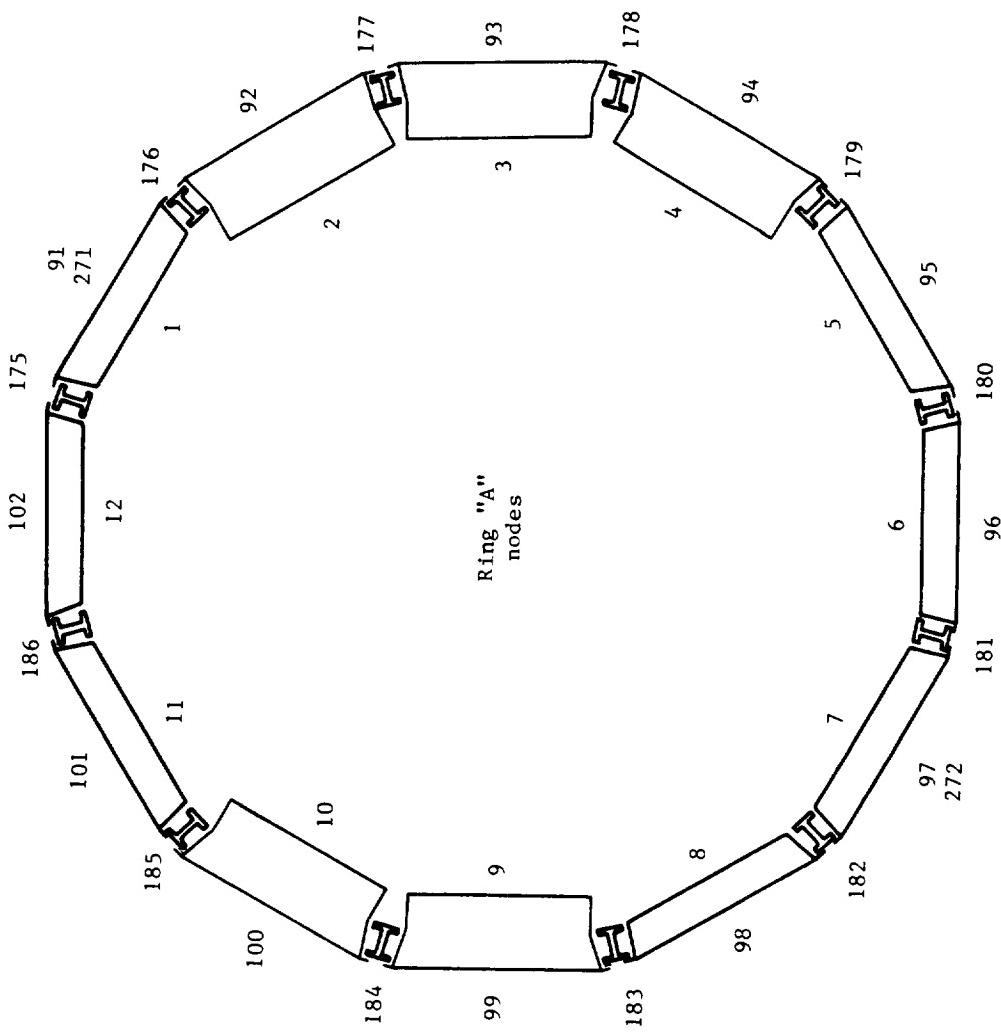


Fig. 17 LDEF Thermal Model, Ring "A" Nodes

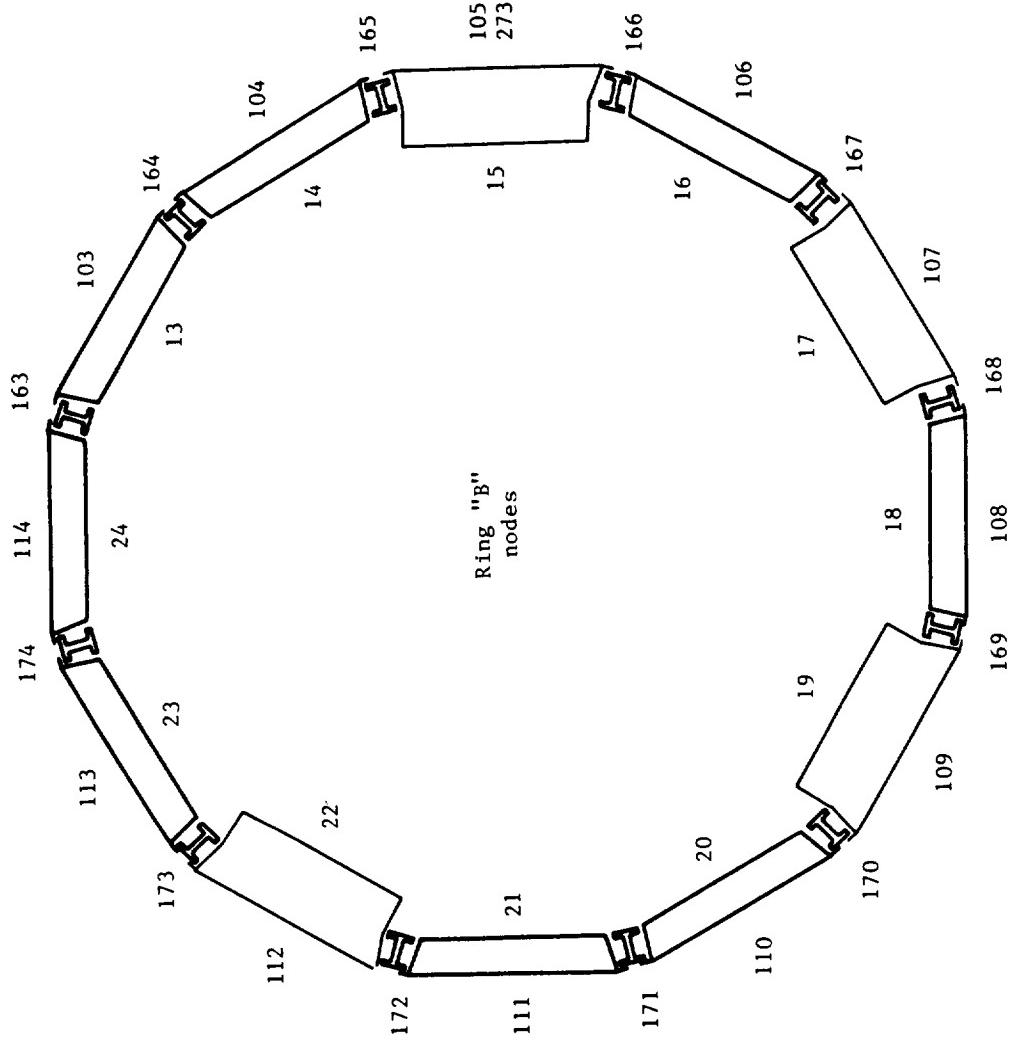


Fig. 18 LDEF Thermal Model, Ring "B" Nodes

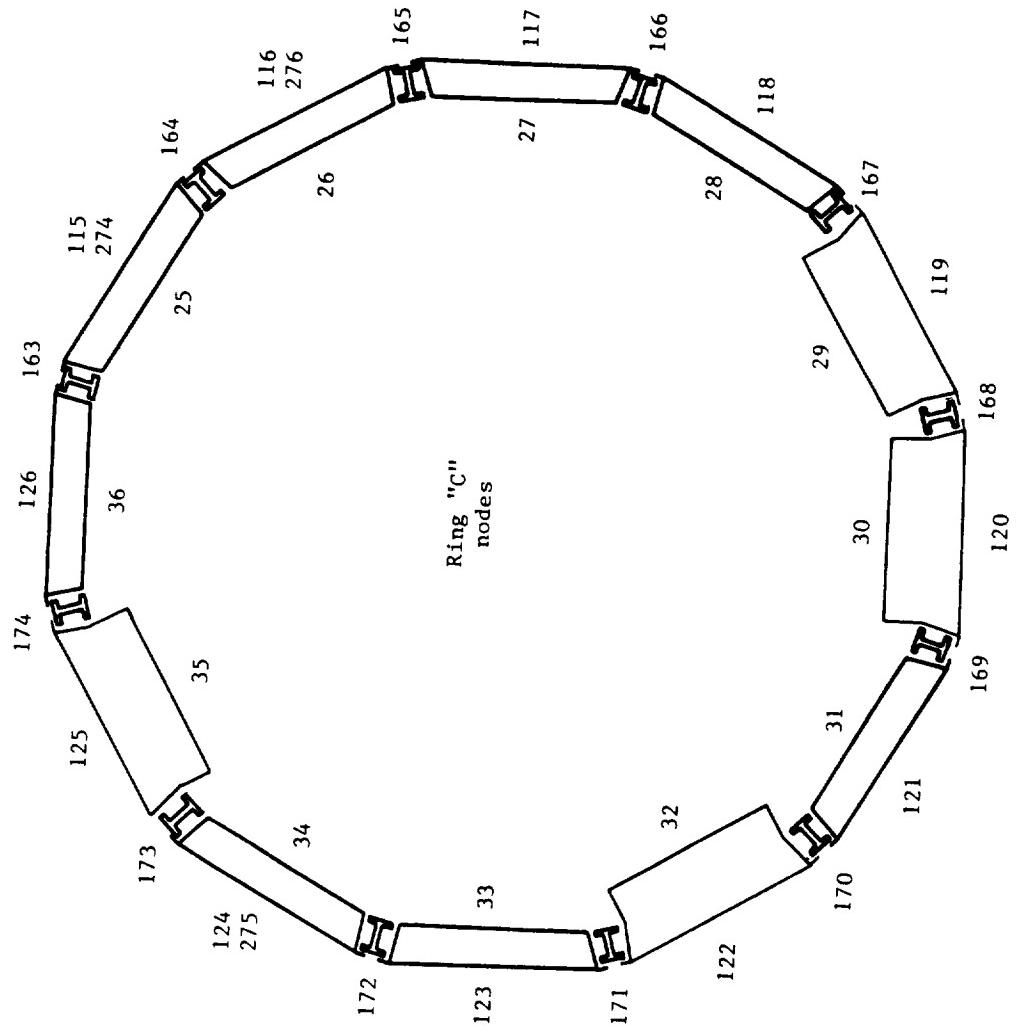


Fig. 19 LDEF Thermal Model, Ring "C" Nodes

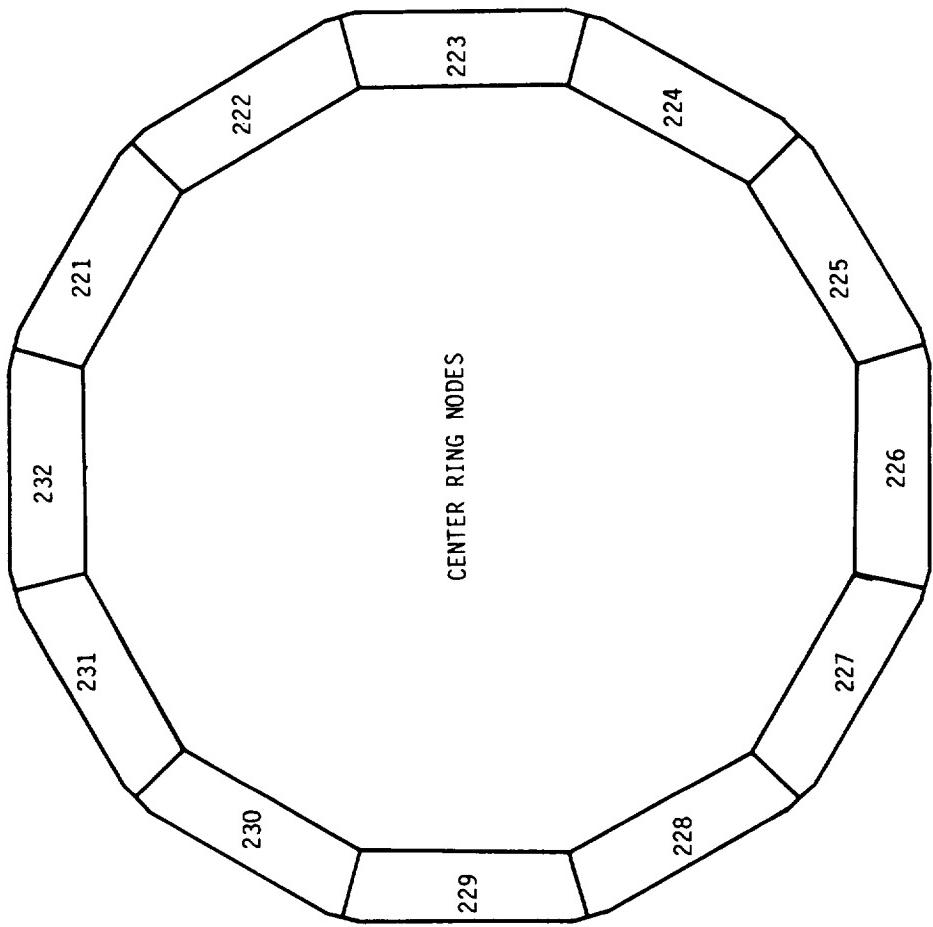


Fig. 20 LDEF Thermal Model, Center Ring Nodes

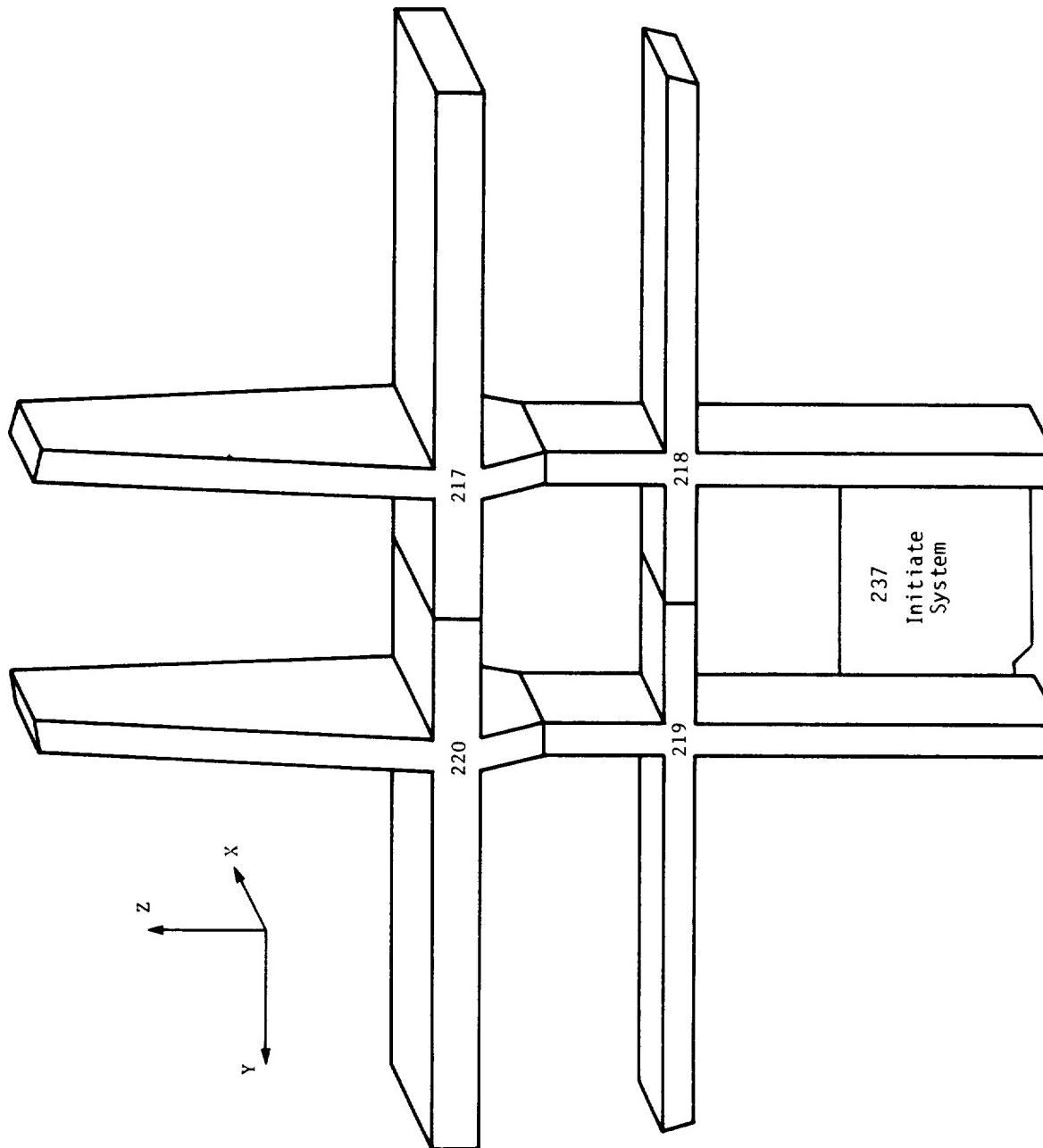


Fig. 21 LDEF Thermal Model, Center Structure Nodes

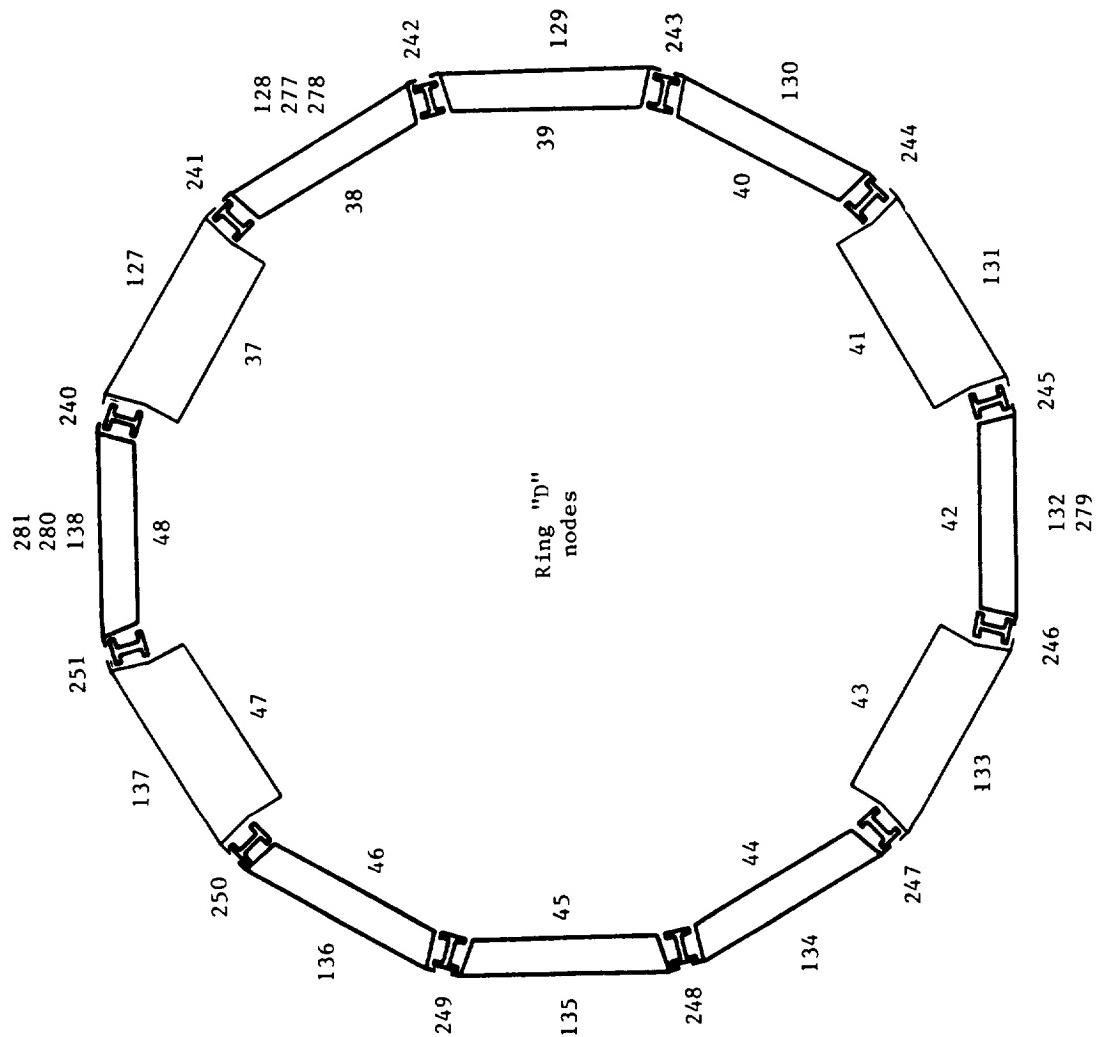


Fig. 22 LDEF Thermal Model, Ring "D" Nodes

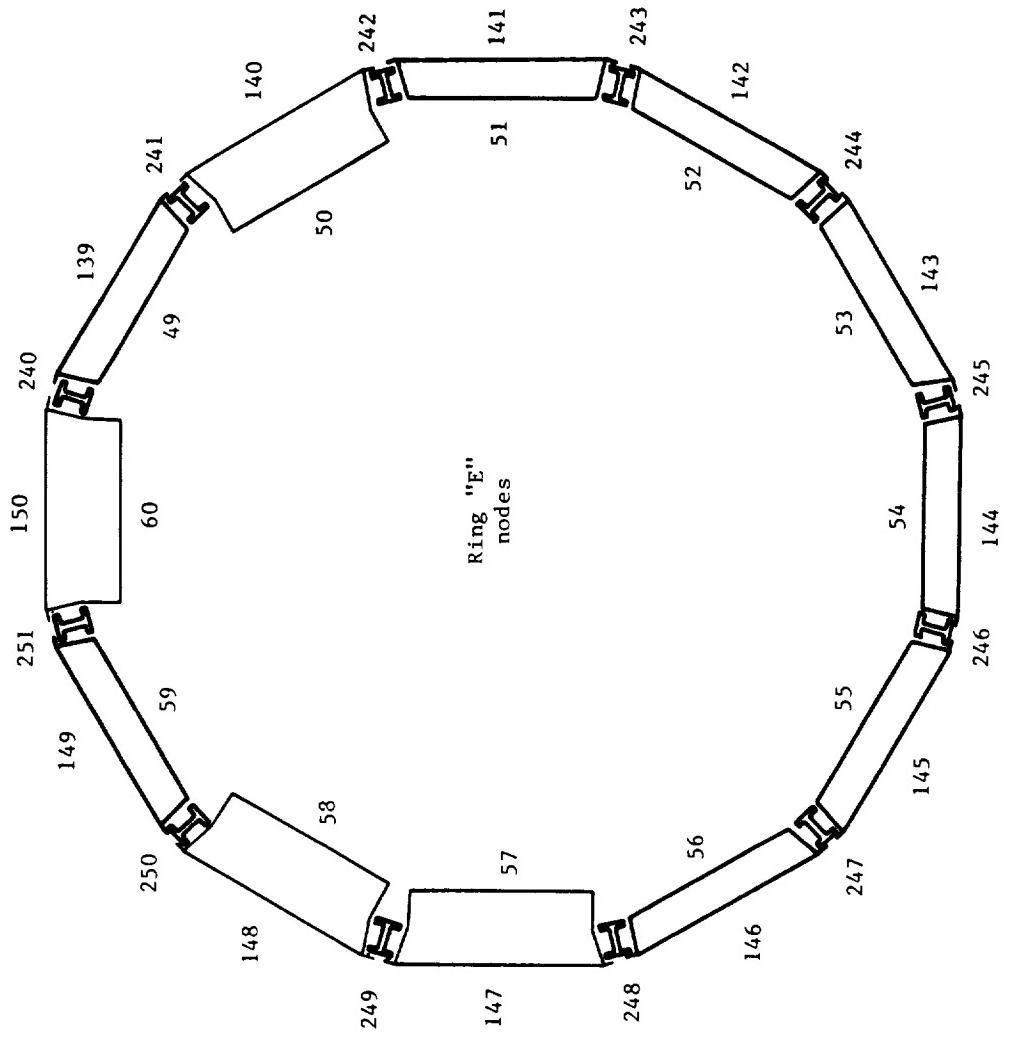


Fig. 23 LDEF Thermal Model, Ring "E" Nodes

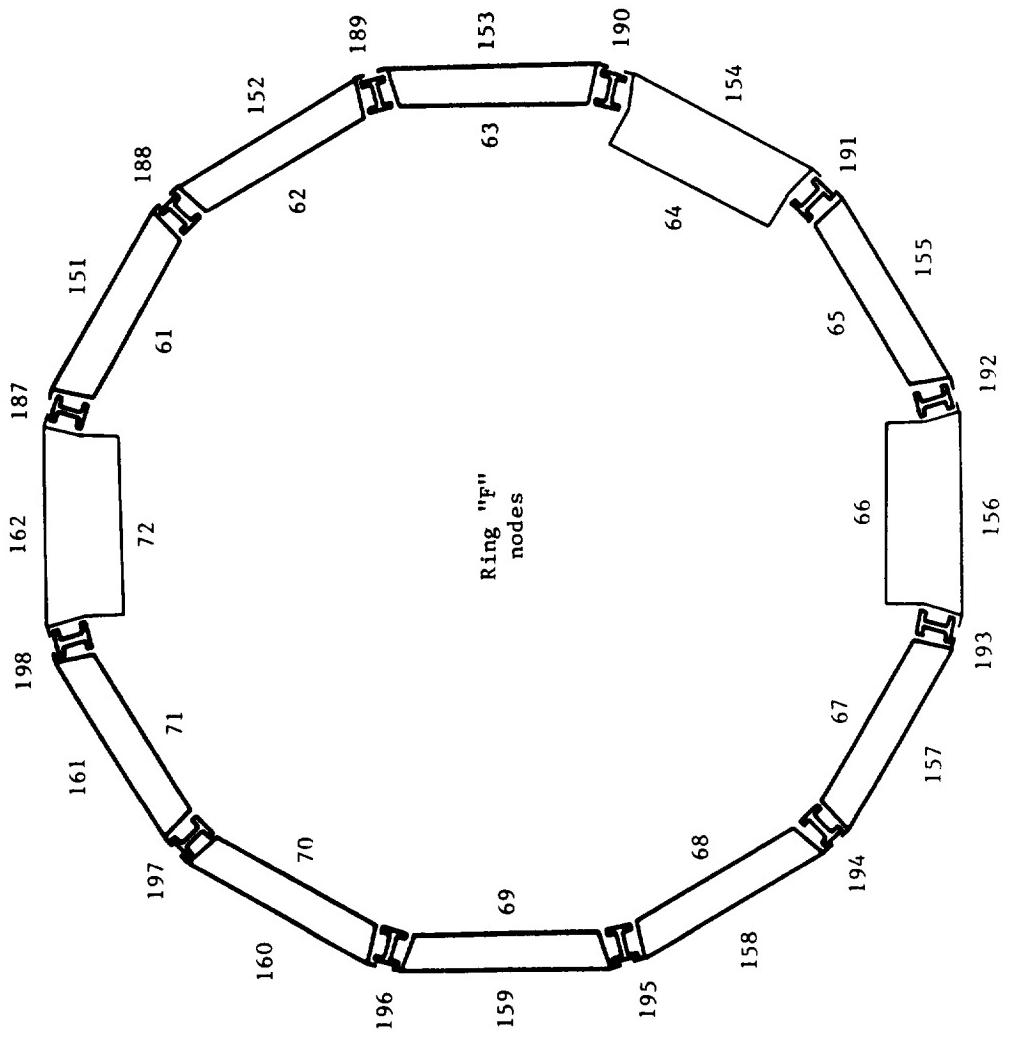


Fig. 24 LDEF Thermal Model, Ring "F" Nodes

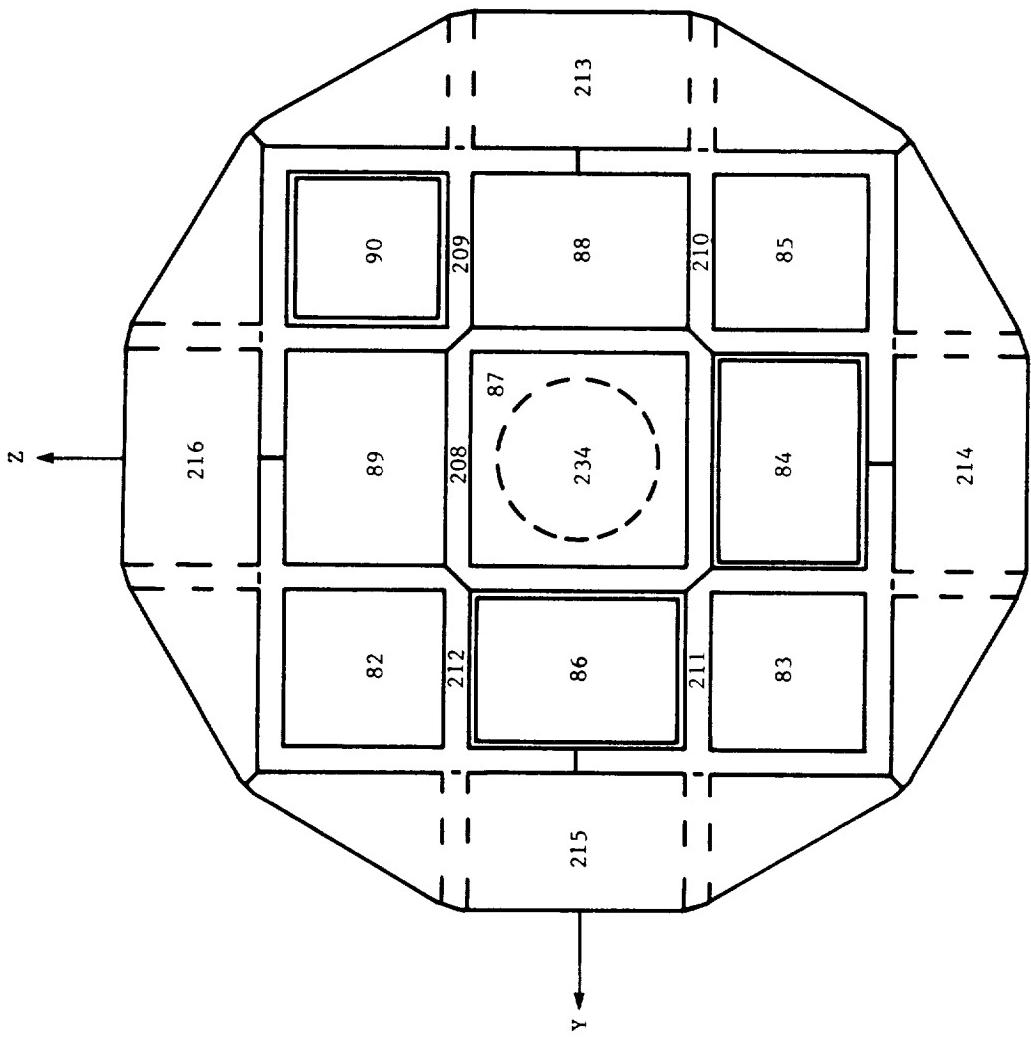


Fig. 25 LDEF Thermal Model, Internal Nodes - Space End

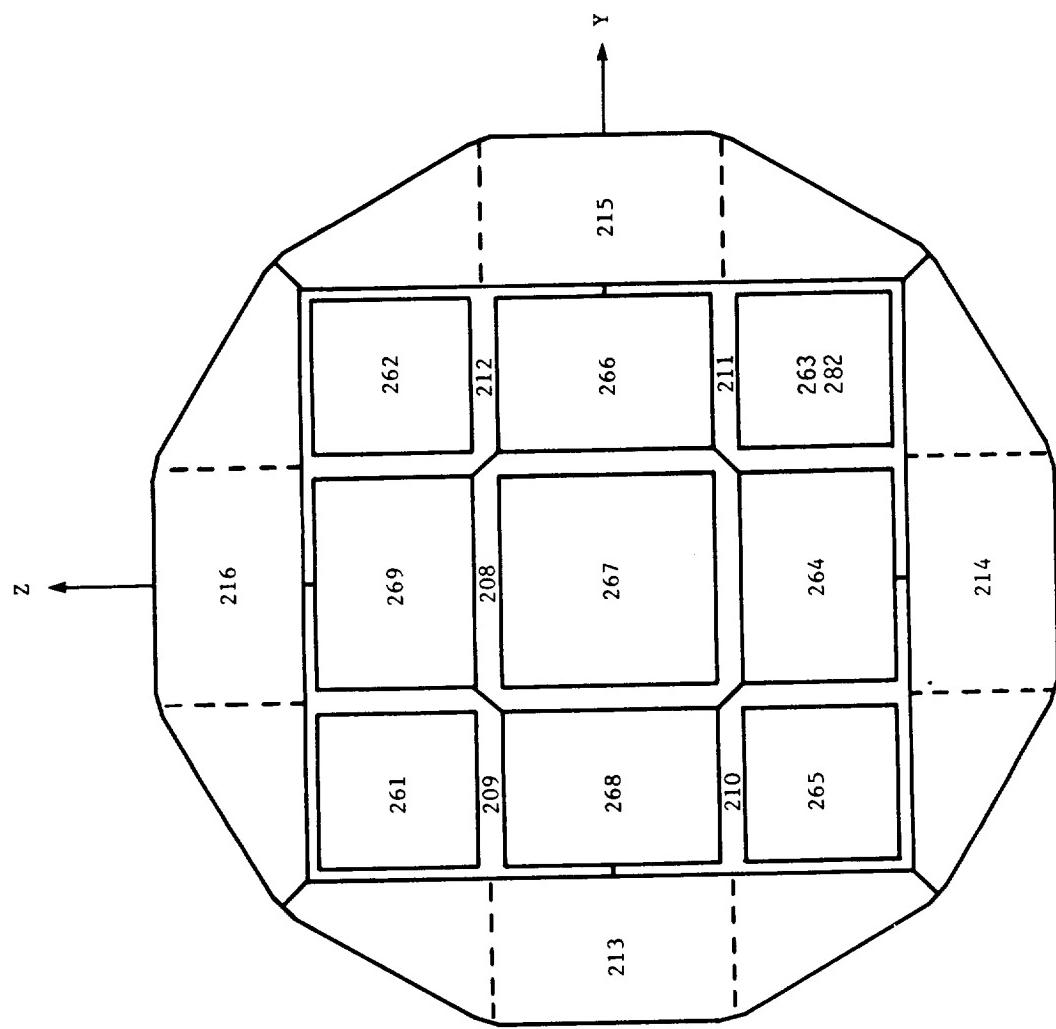


Fig. 26 LDEF Thermal Model, External Nodes - Space End

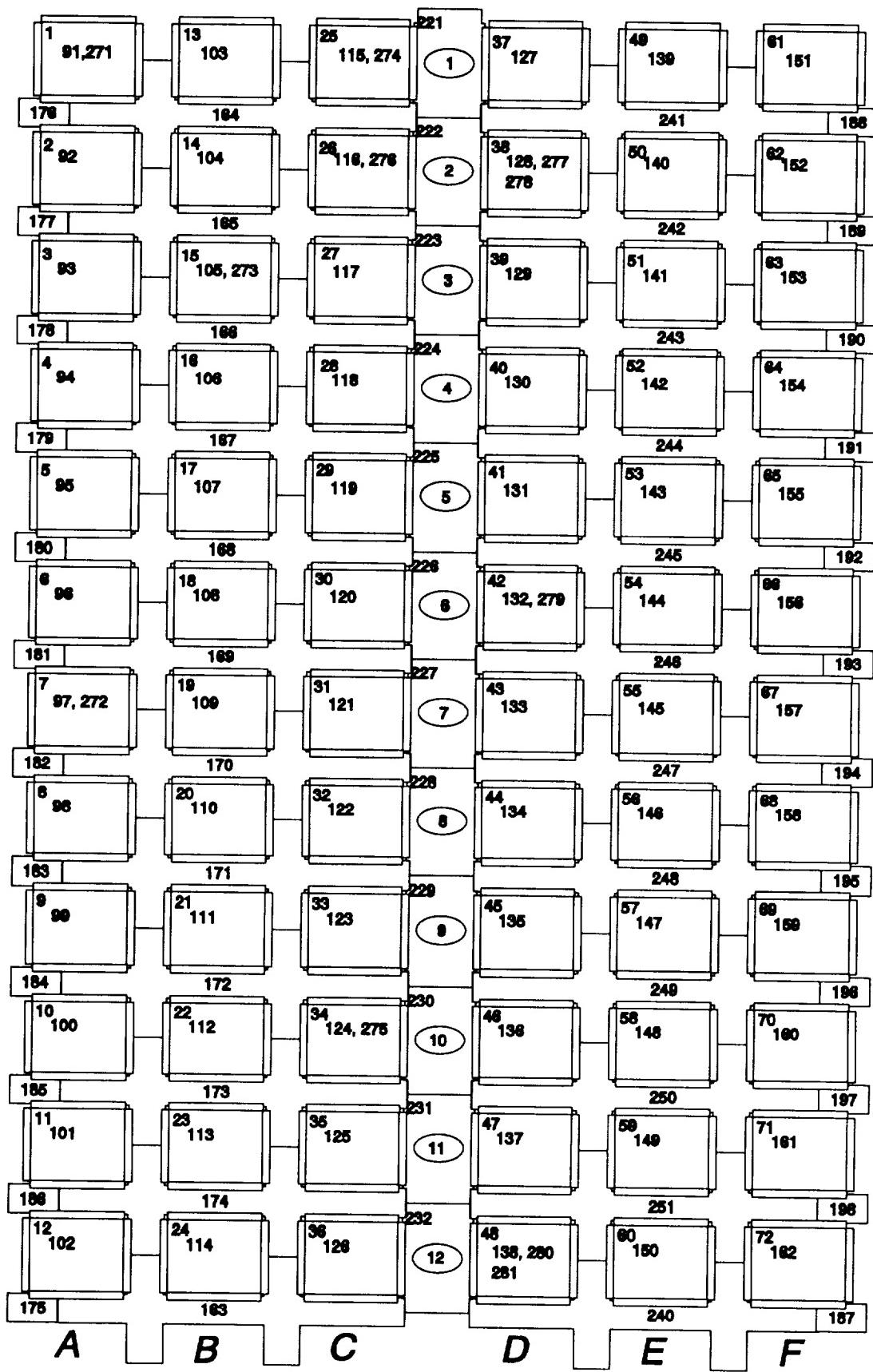
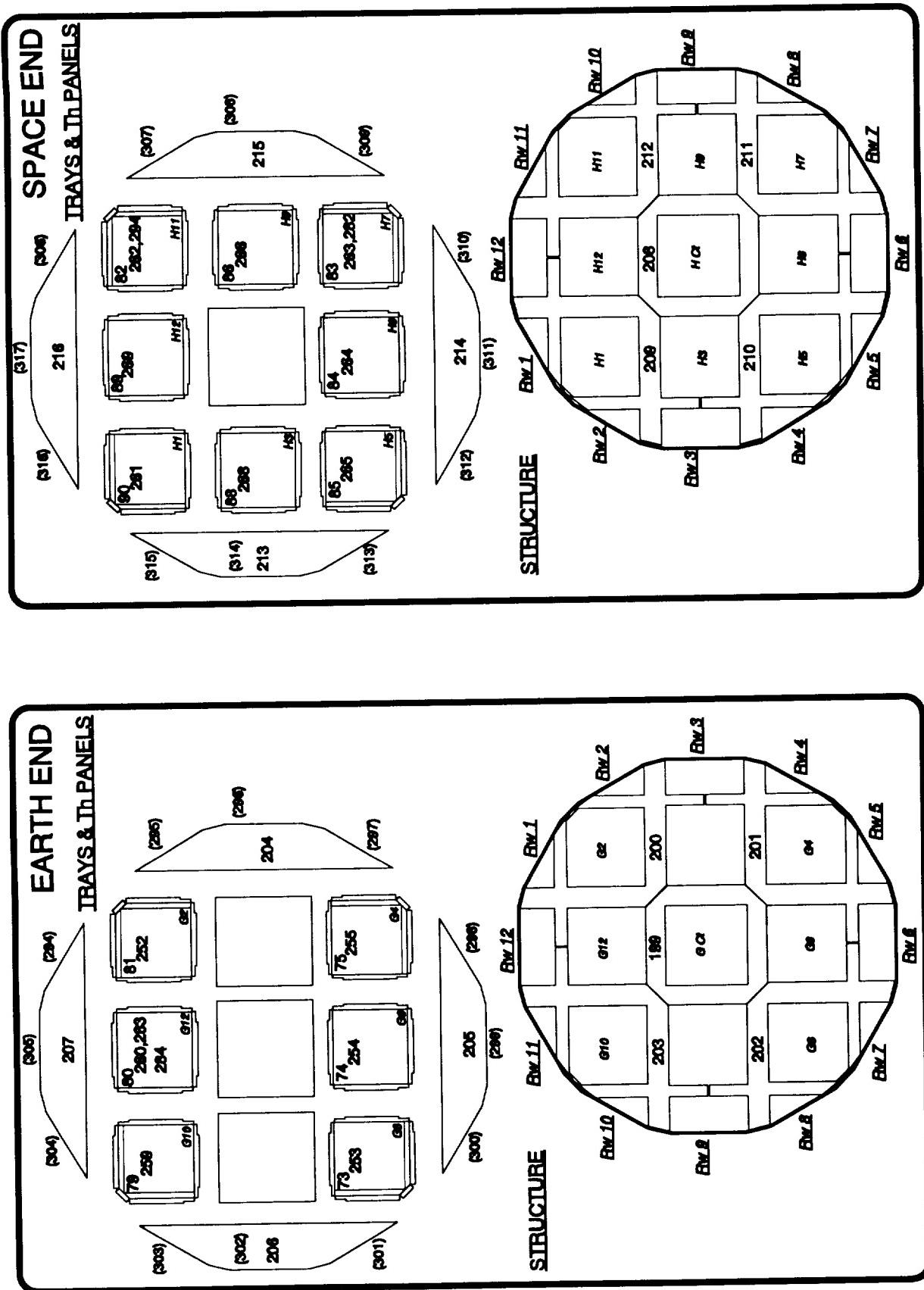
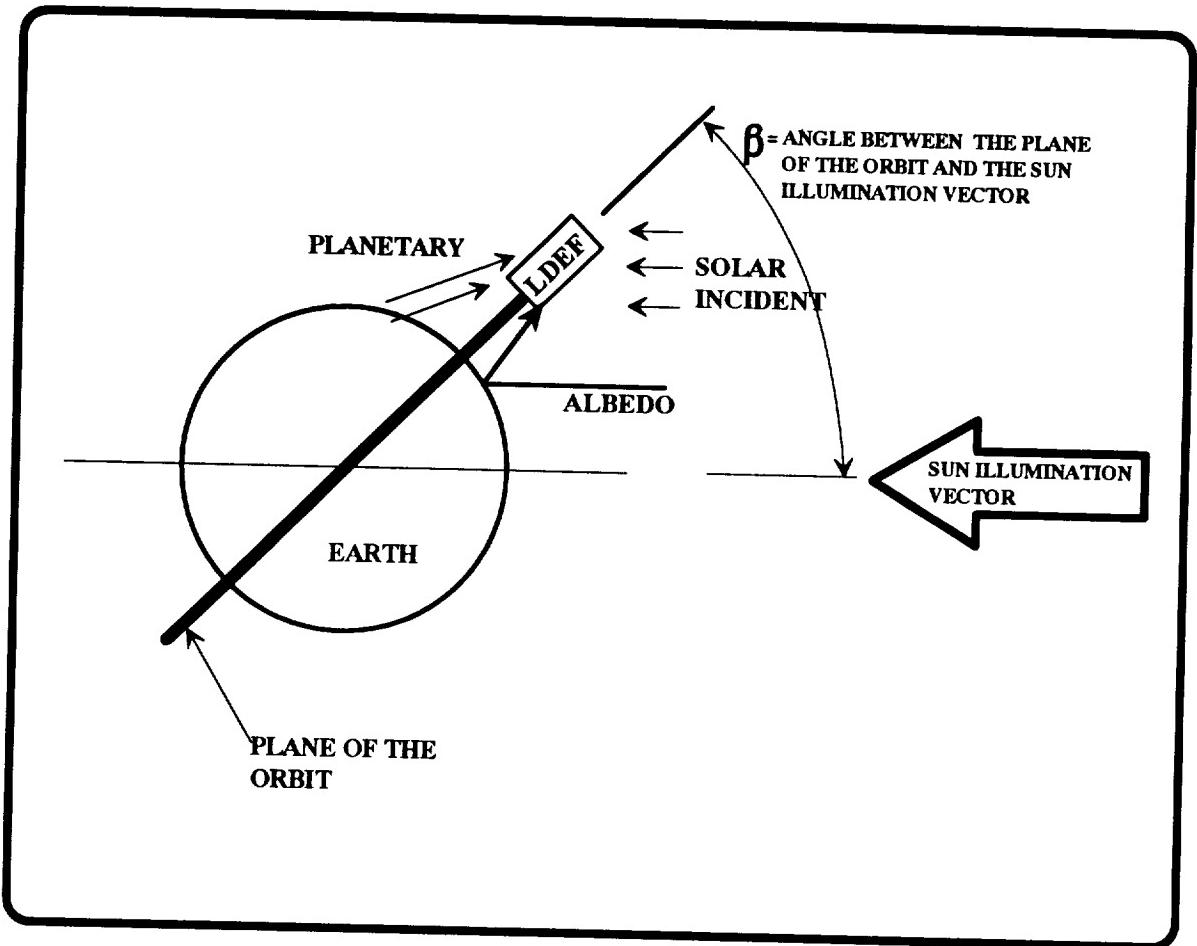


Fig. 27 LDEF PERIPHERY EXTERNAL NODALIZATION

Fig. 28 LDEF END TRAY/STRUCTURE NODE DISTRIBUTION





BETA ANGLE= (β) Angle between the plane of the orbit and the sun illumination vector.

SOLAR INCIDENT= (BTU/Hr-F $^{\circ}$) Heat due to direct illumination from the sun.

ALBEDO= (BTU/Hr-F $^{\circ}$) Heat due to the portion of the solar incident energy reflected from the planet into the LDEF.

PLANETARY= (BTU/Hr-F $^{\circ}$) Heat due to energy emitted from the planet.

Fig. 29 LDEF Beta Angle Definition.

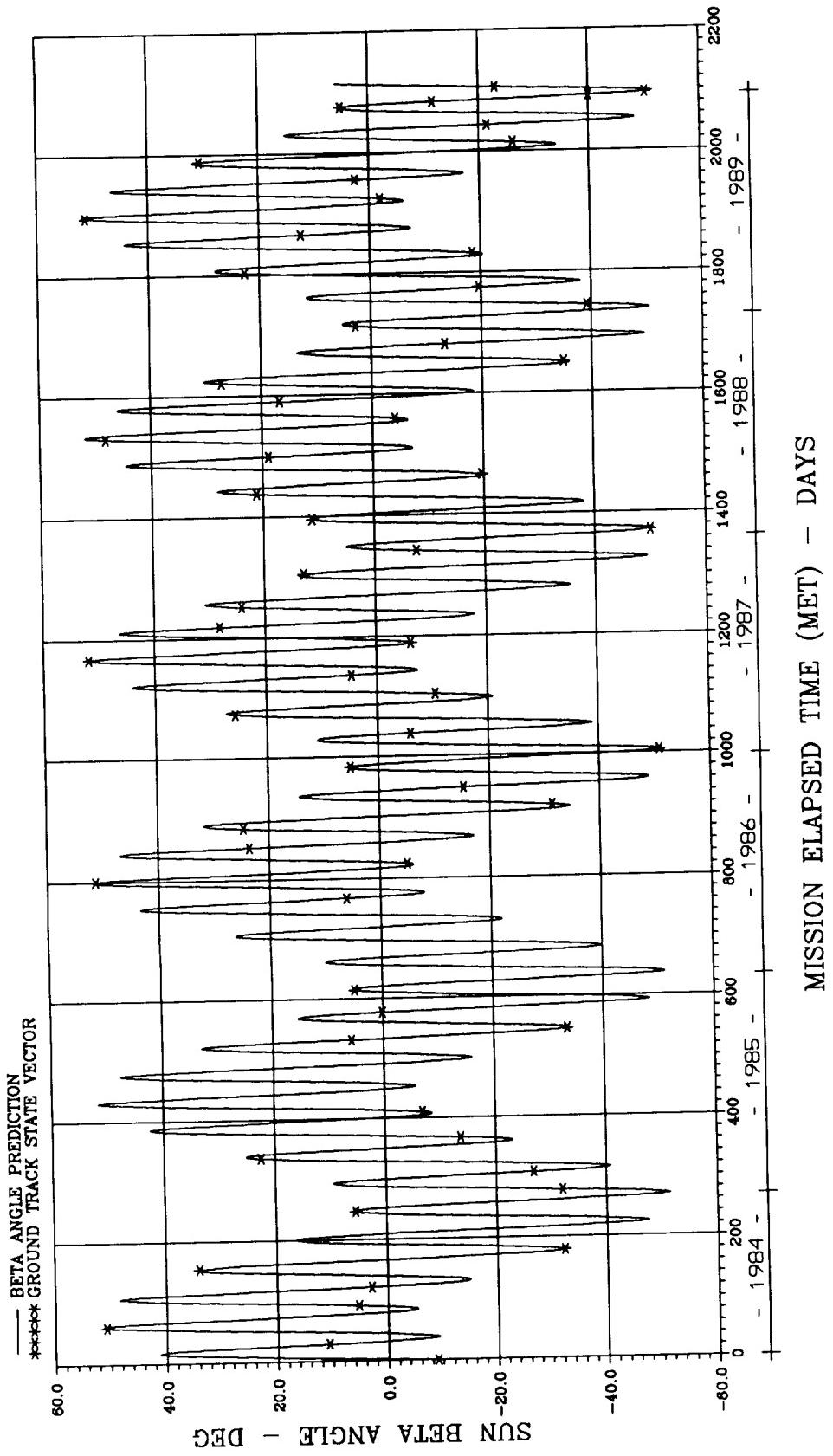


Fig. 30 LDEF BETA ANGLE HISTORY: APRIL 7, 1984 – JANUARY 12, 1990.

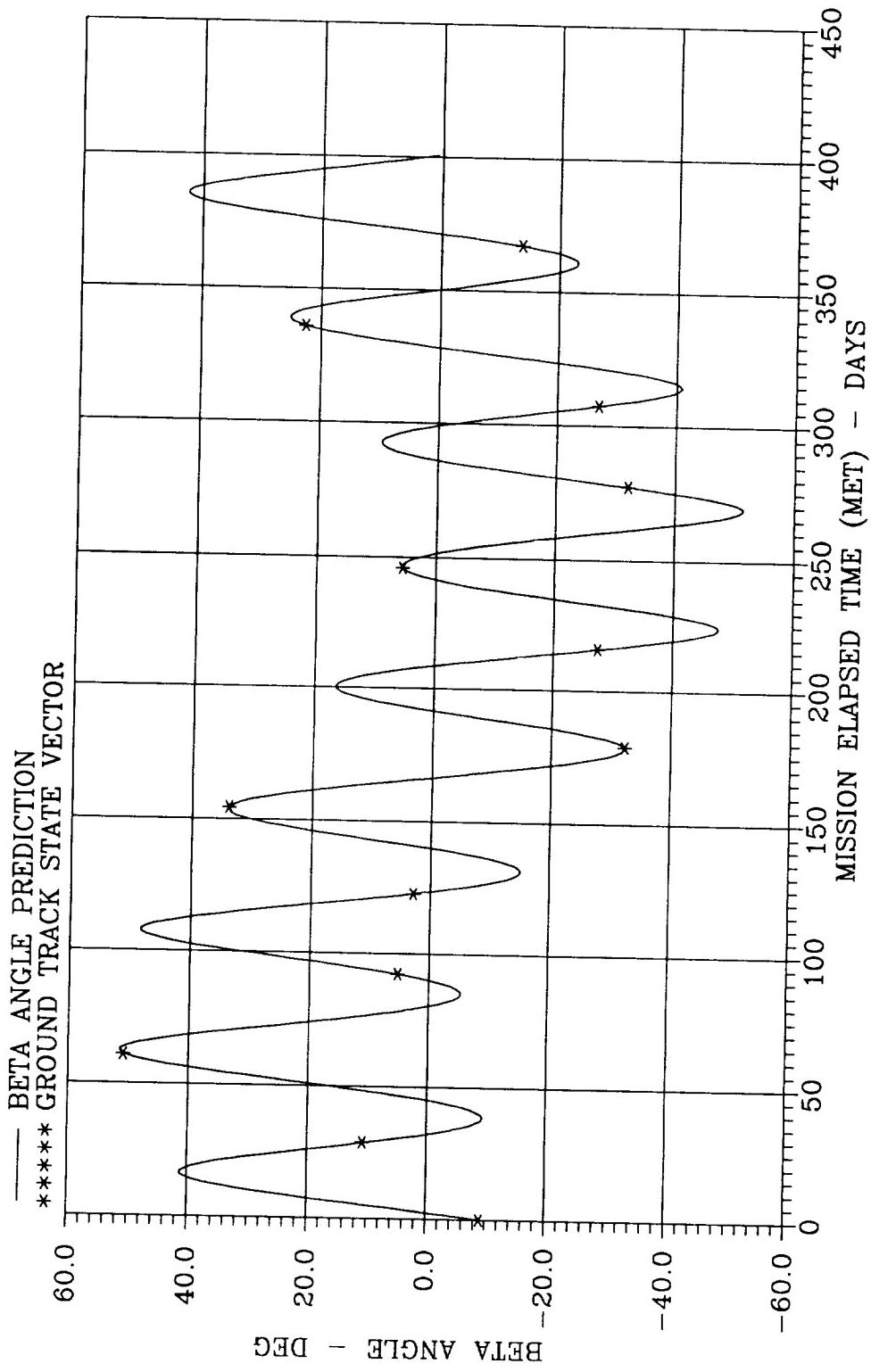


Fig. 31 LDEF BETA ANGLE HISTORY: APRIL 7, 1984 – MAY 13, 1985.

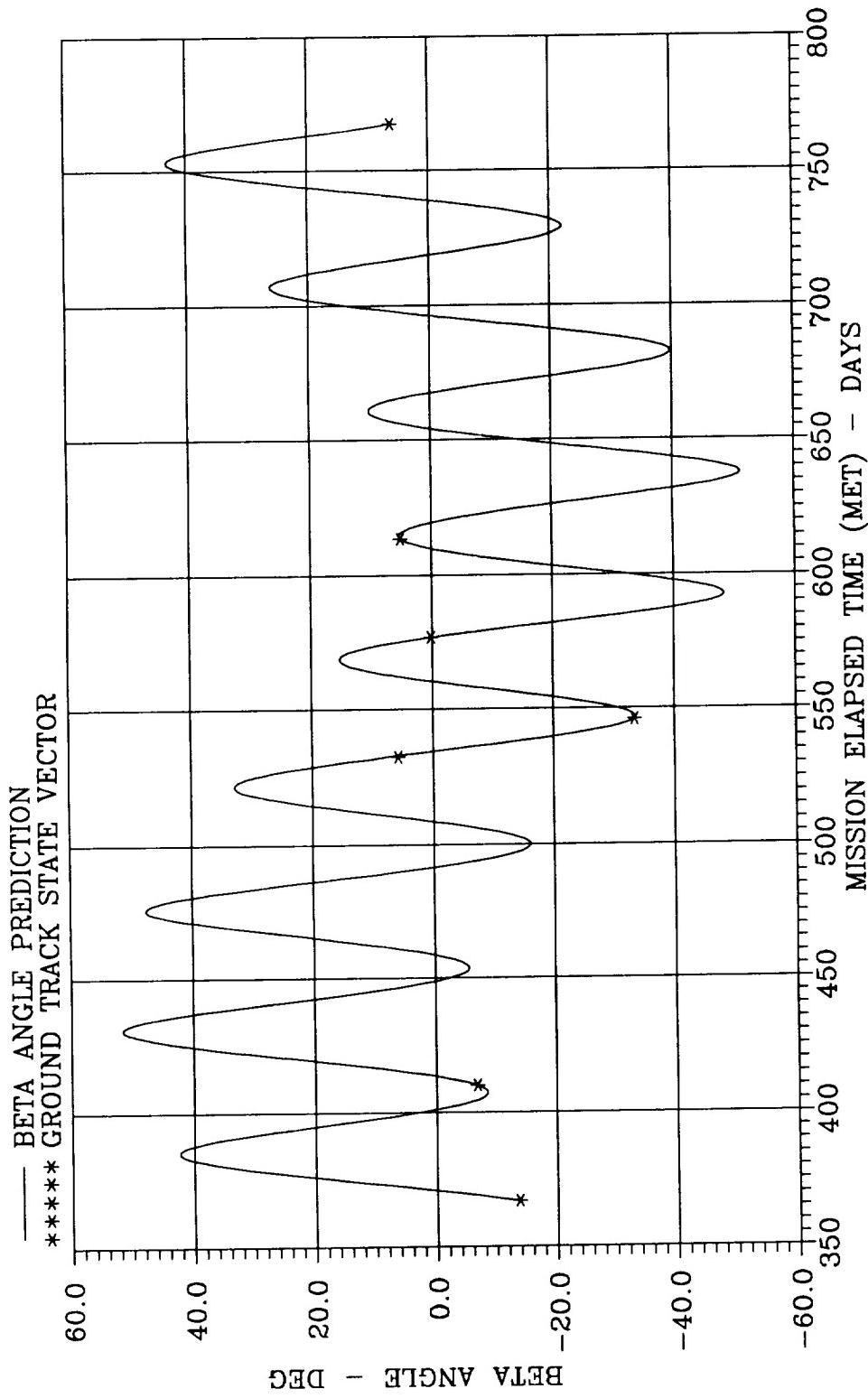


Fig. 32 LDEF BETA ANGLE HISTORY: APRIL 9, 1985 – MAY 14, 1986.

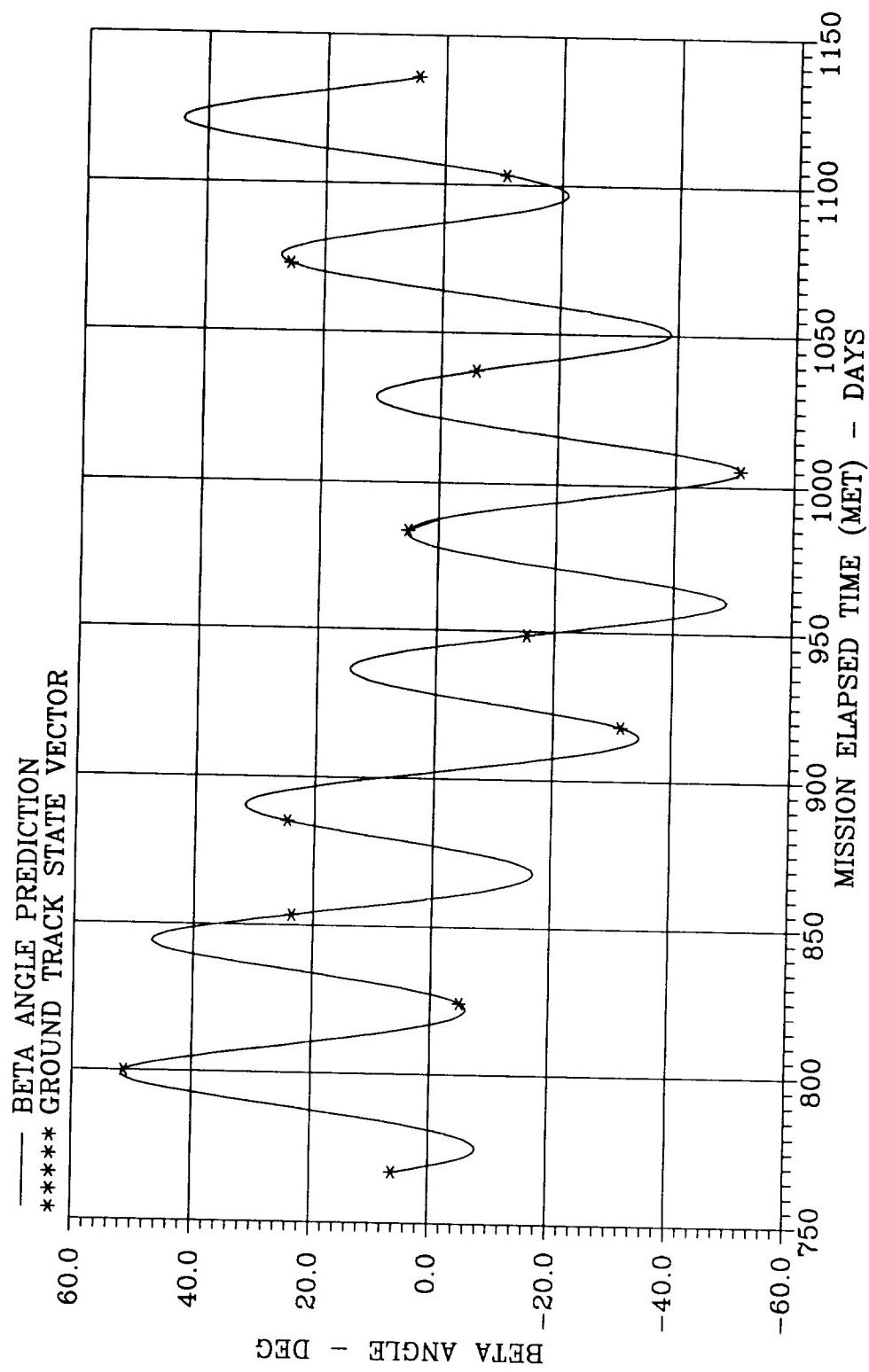


Fig. 33 LDEF BETA ANGLE HISTORY: MAY 14, 1986 – MAY 18, 1987.

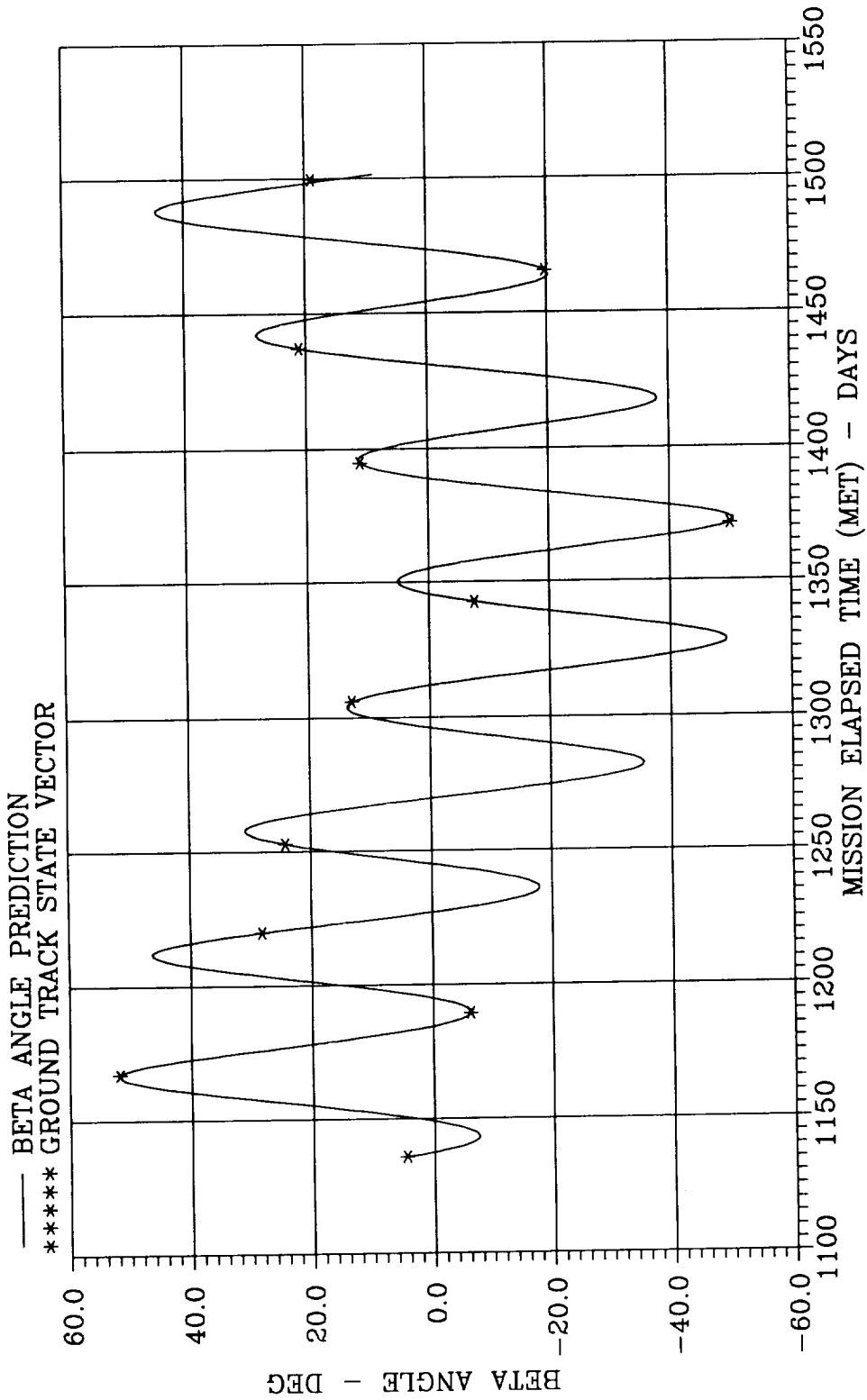


Fig. 34 LDEF BETA ANGLE HISTORY: MAY 18, 1987 – MAY 18, 1988.

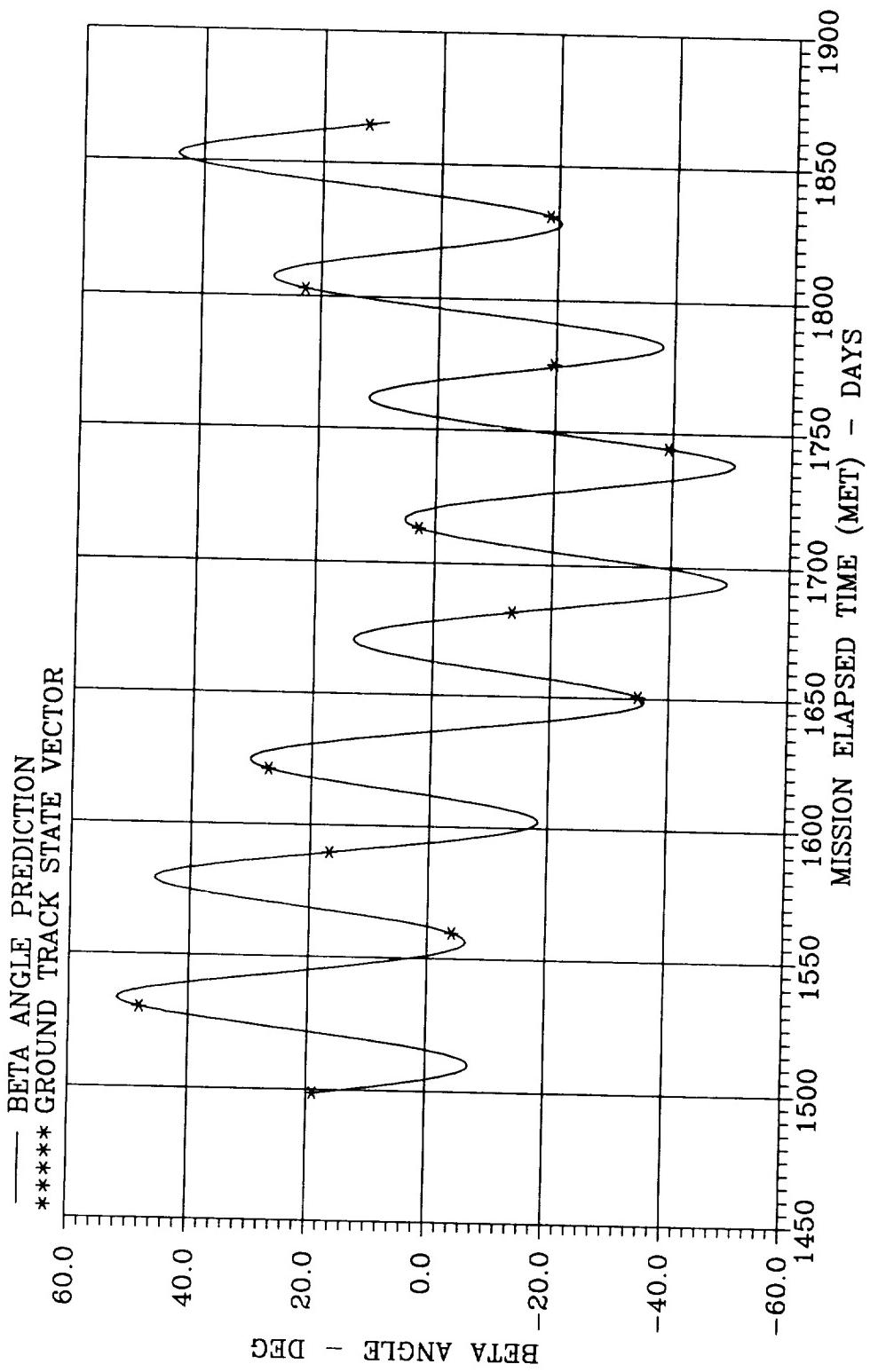


Fig. 35 LDEF BETA ANGLE HISTORY: MAY 15, 1988 – MAY 15, 1989.

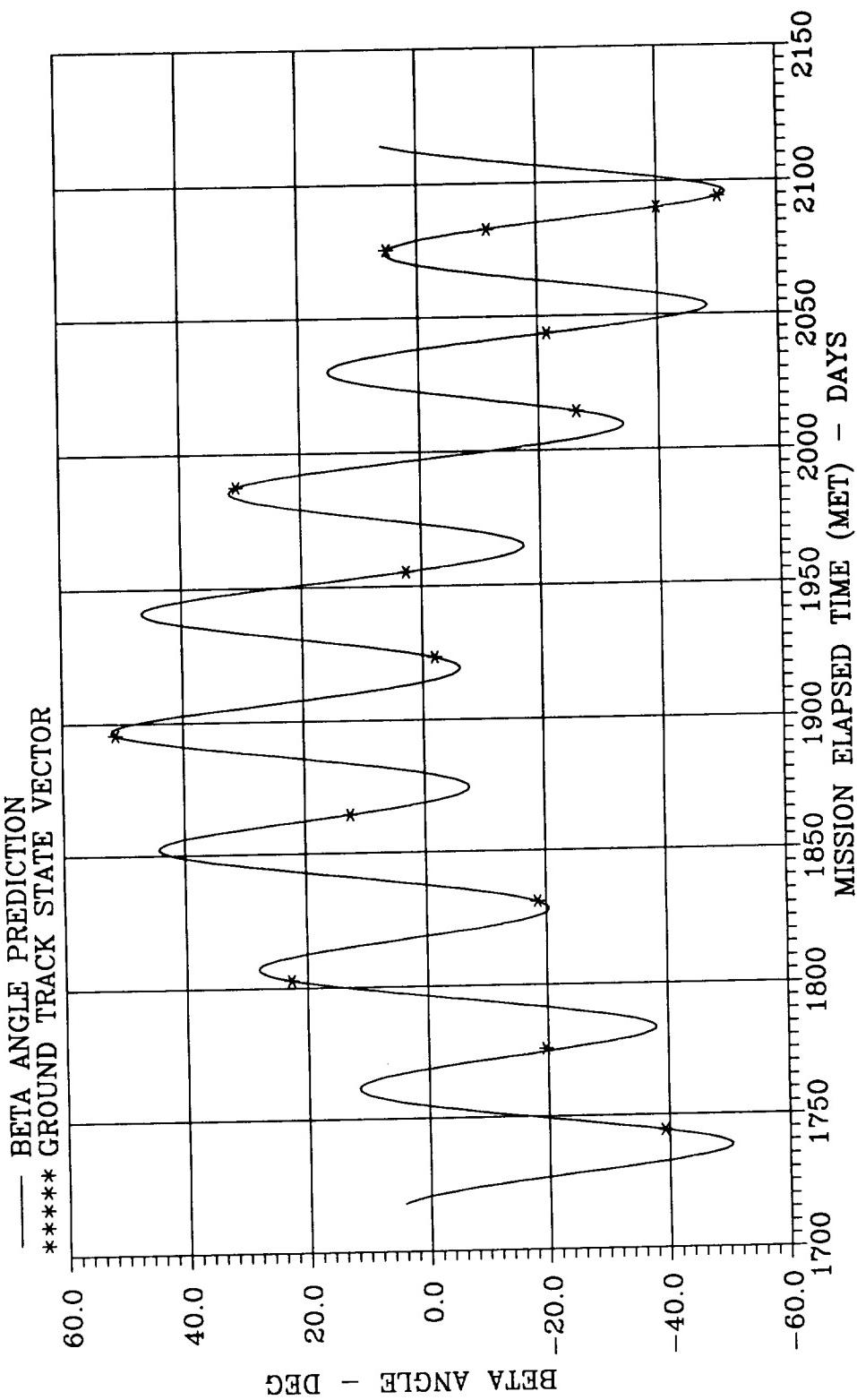


Fig. 36 LDEF BETA ANGLE HISTORY: DECEMBER 20, 1988 – JANUARY 12, 1990.

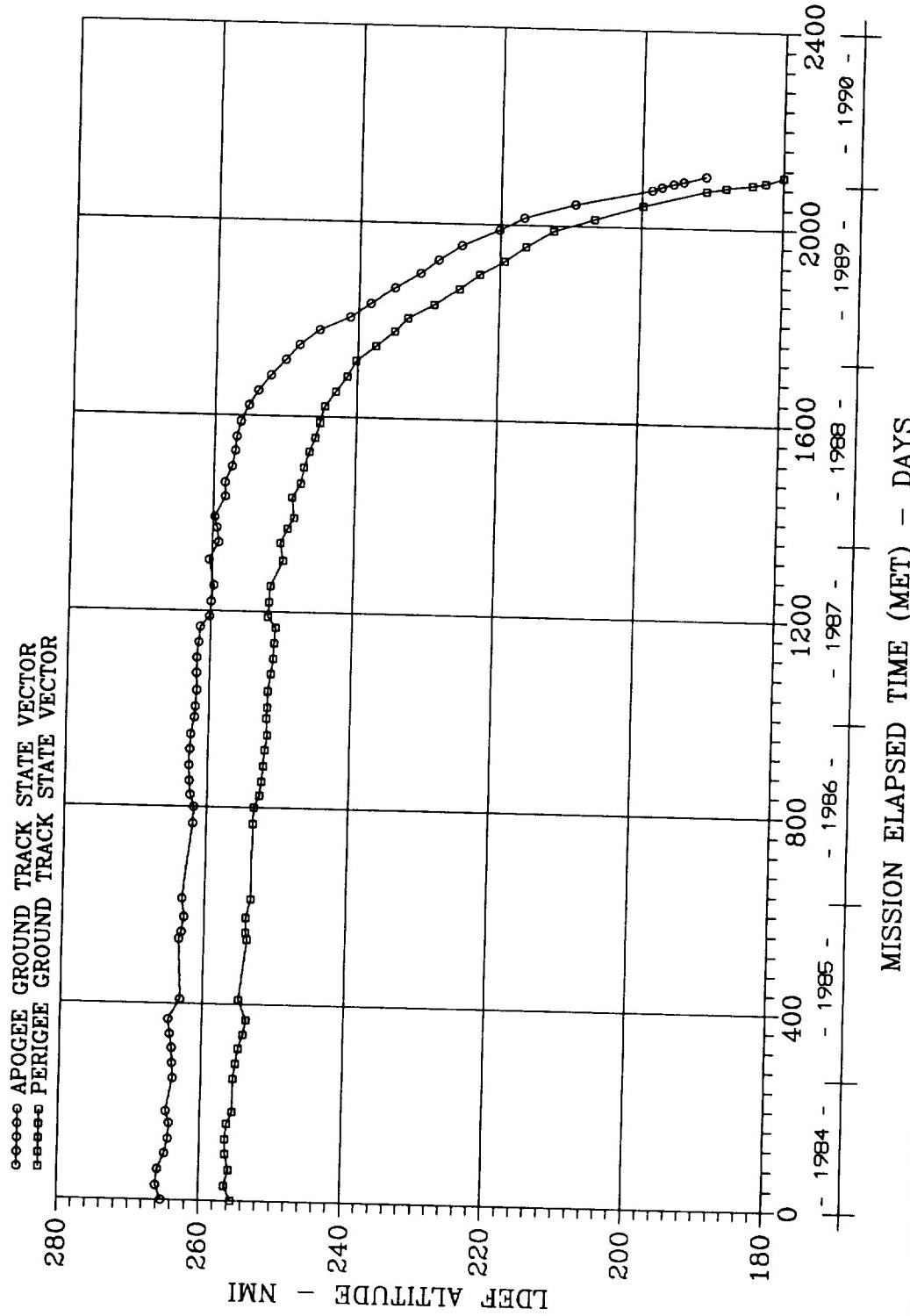


Fig. 37 LDEF ALTITUDE HISTORY: APRIL 7, 1984 - JANUARY 12, 1990.

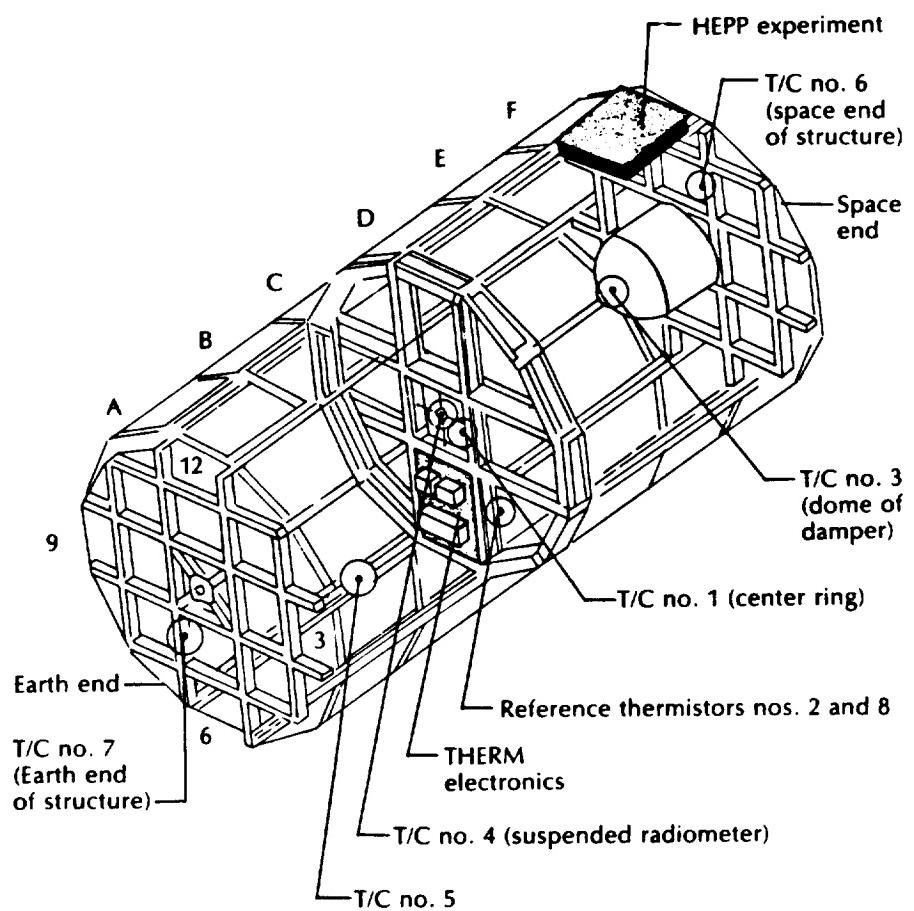


Fig. 38 Location of THERM Hardware on the LDEF

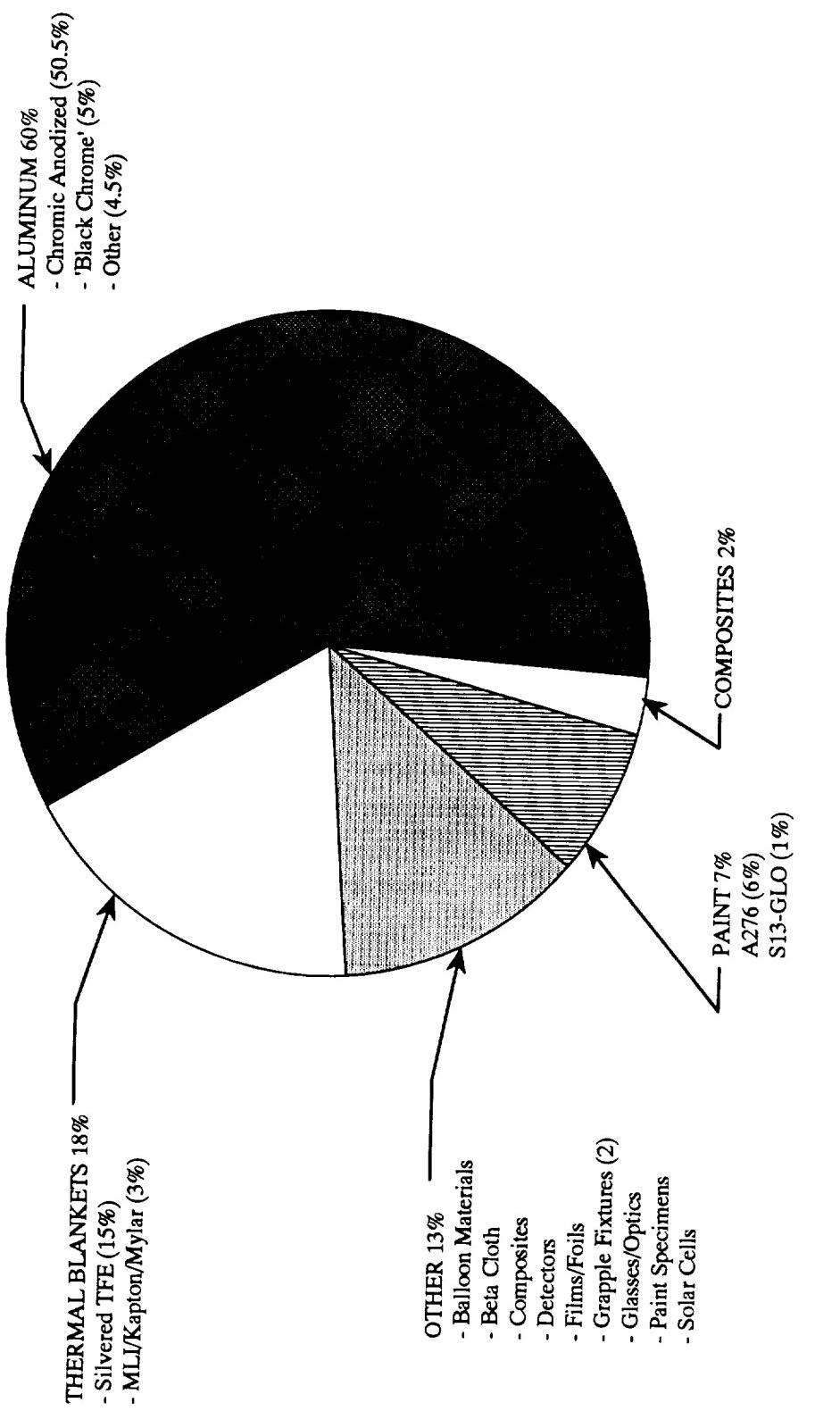


Fig. 39 LDEF External Surface Coating Distribution

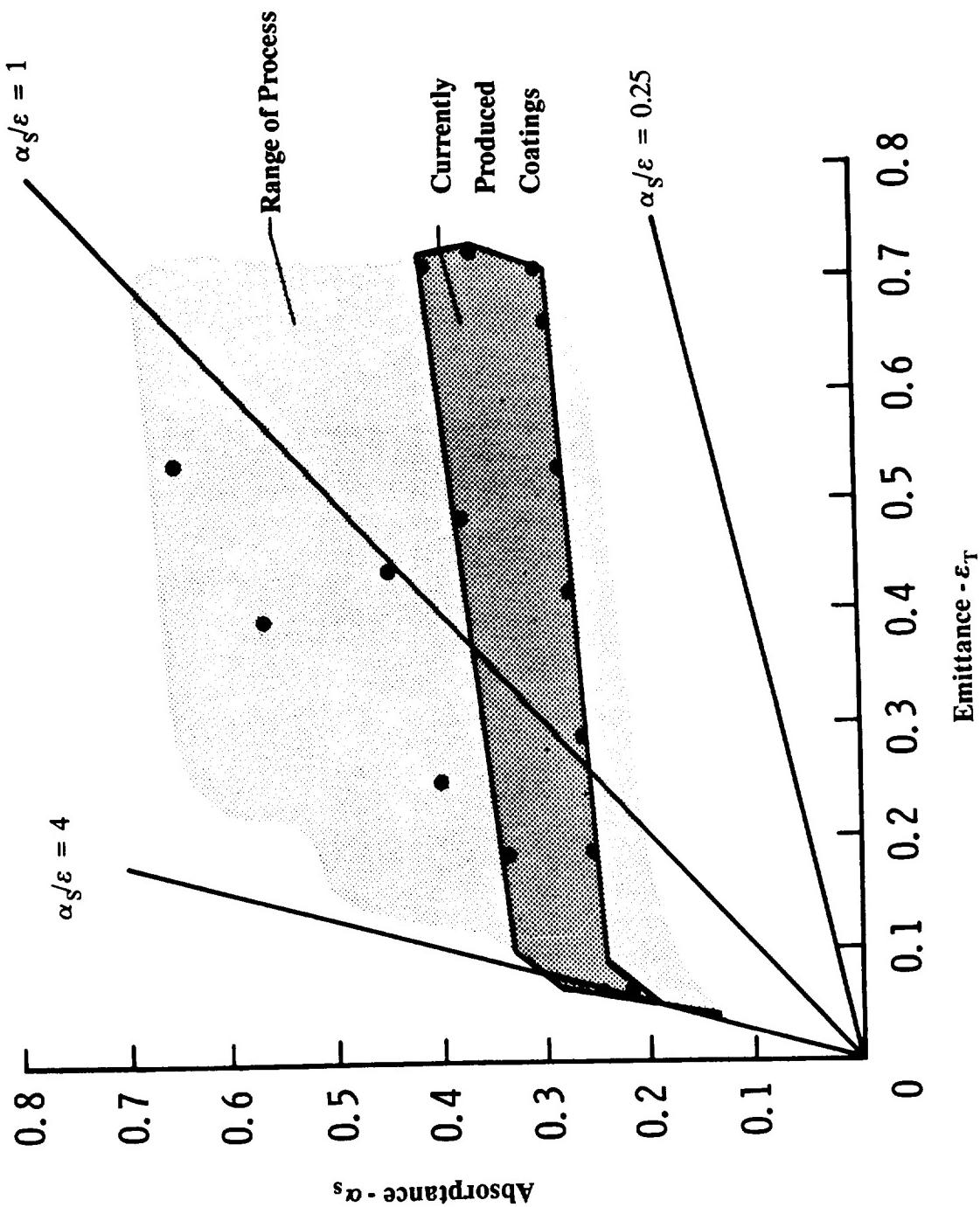


Fig. 40 Variable Anodic Thermal Control Coating Property Range.

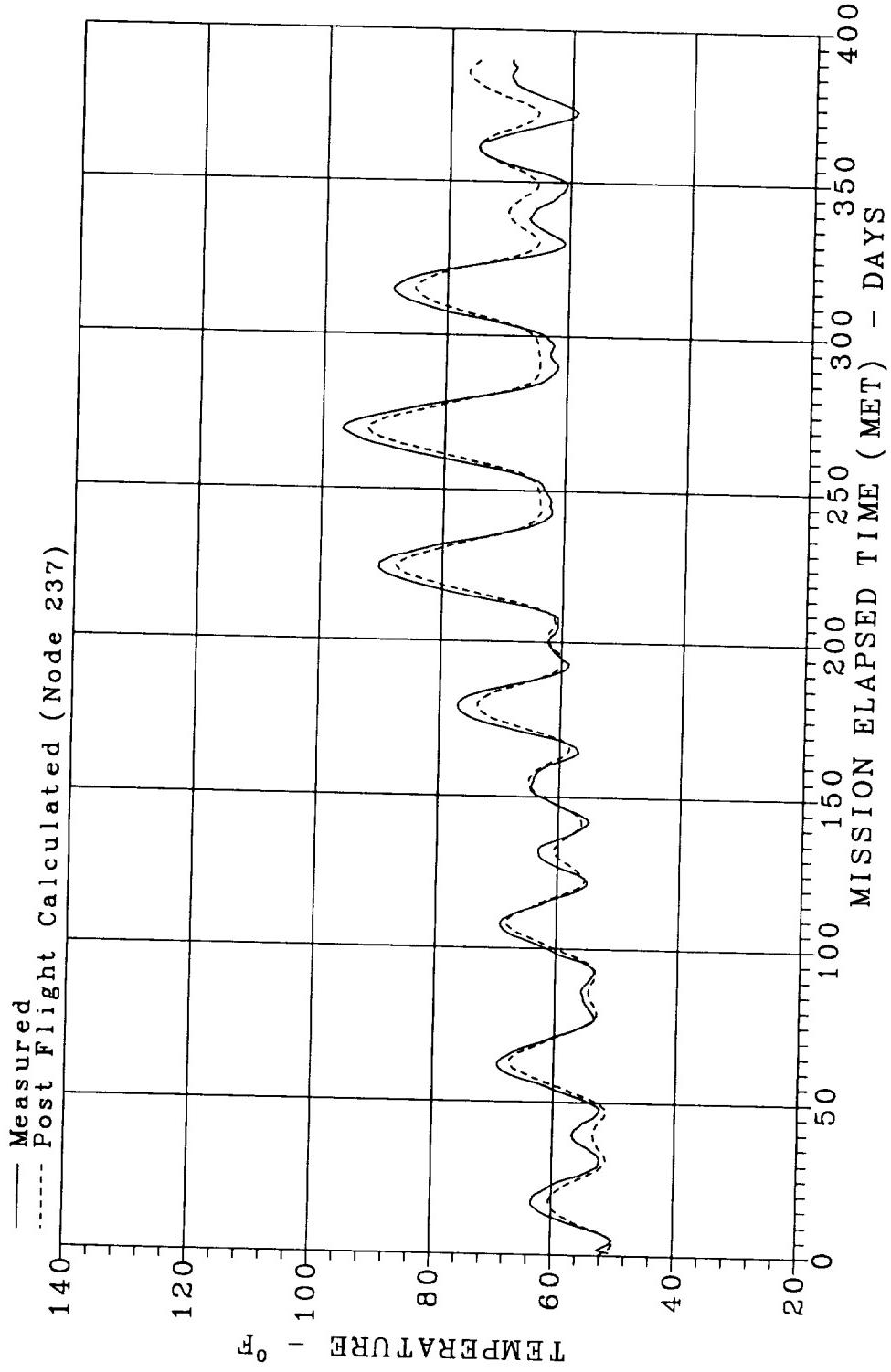


Figure 41 THERM Thermistor Data vs LDEF Post Flight Thermal Model.

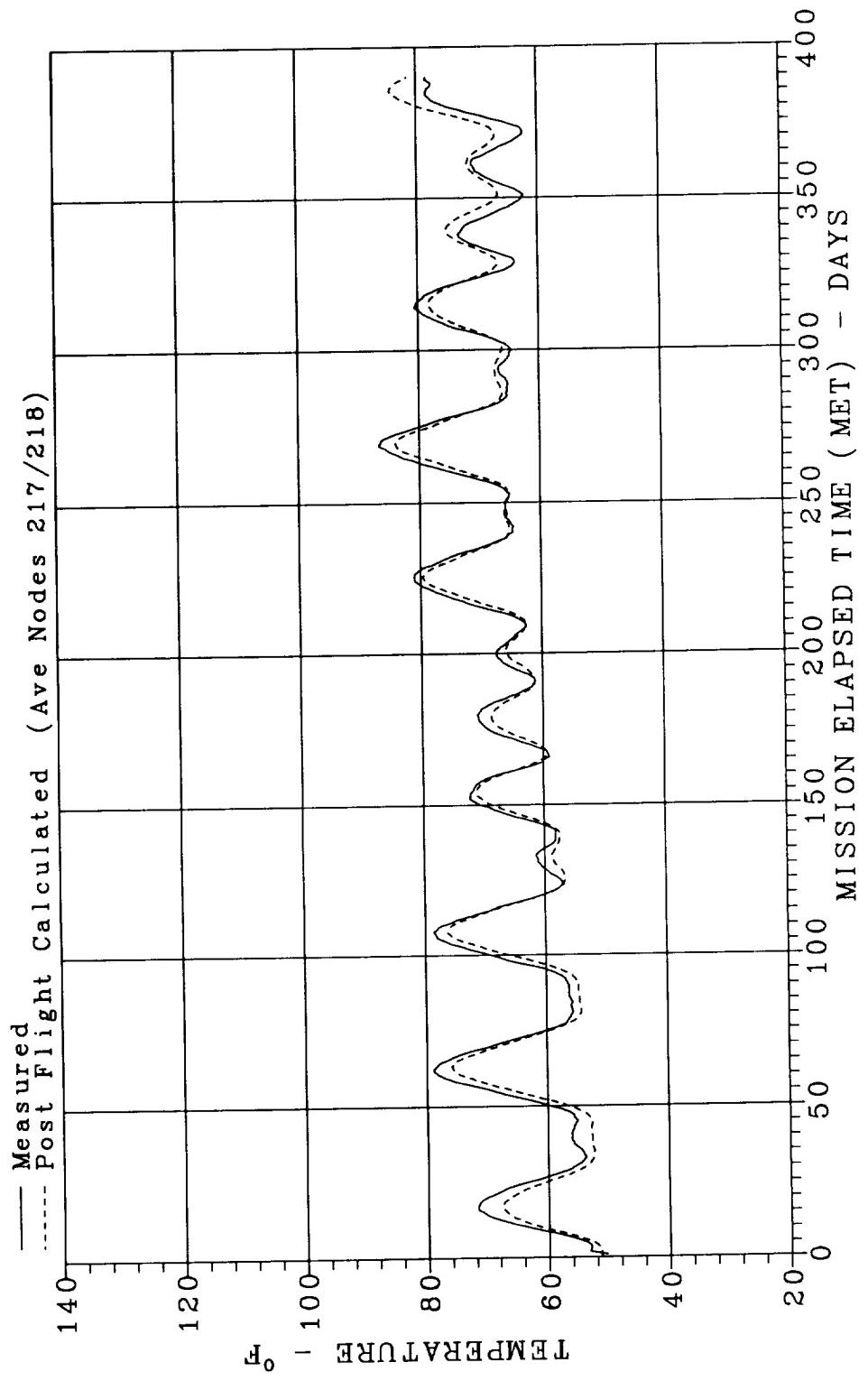


Figure 42 THERM Center Ring Data vs LDEF Post Flight Thermal Model.

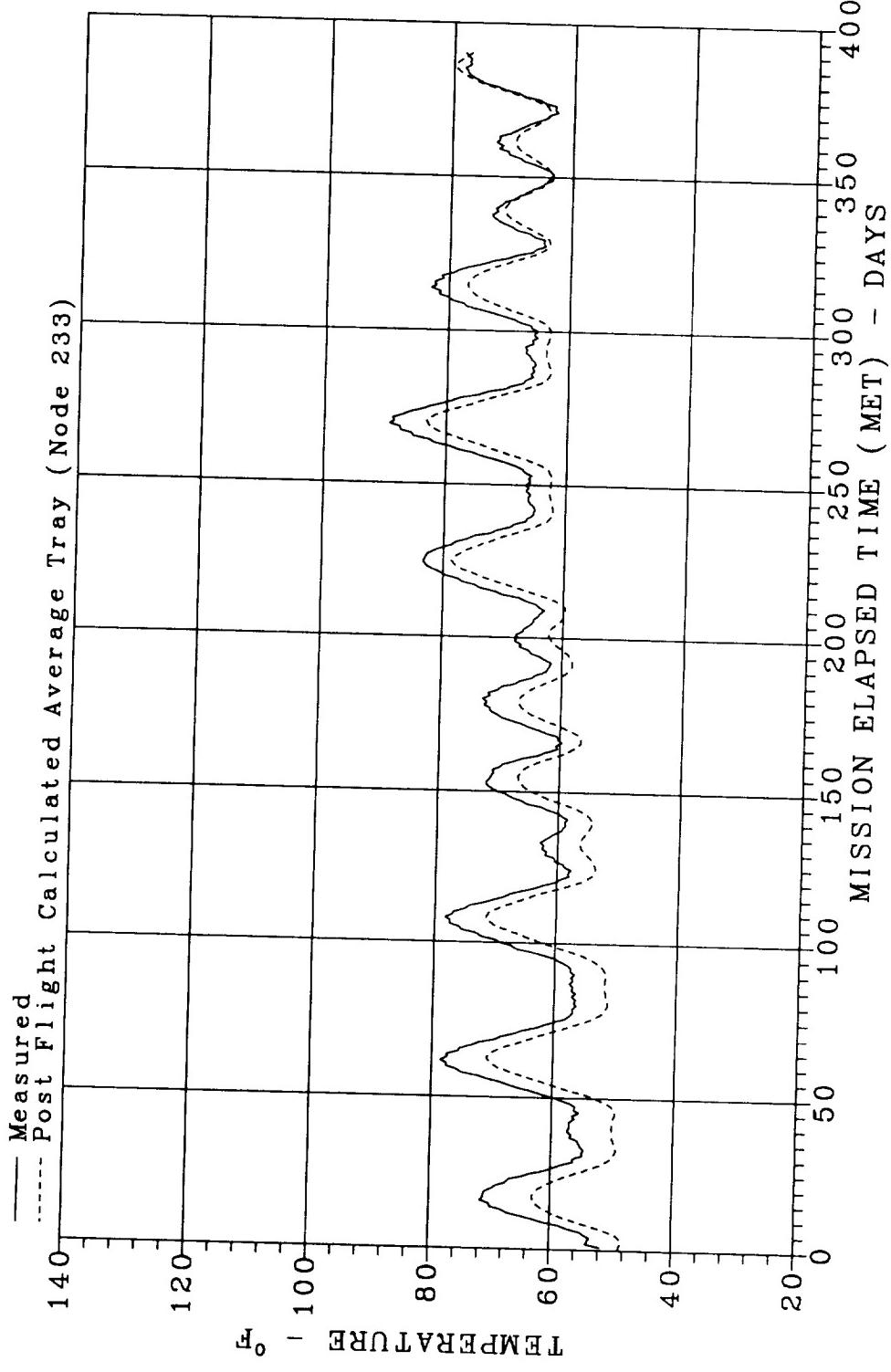


Figure 43 THERM Radiometer Data vs LDEF Post Flight Thermal Model.

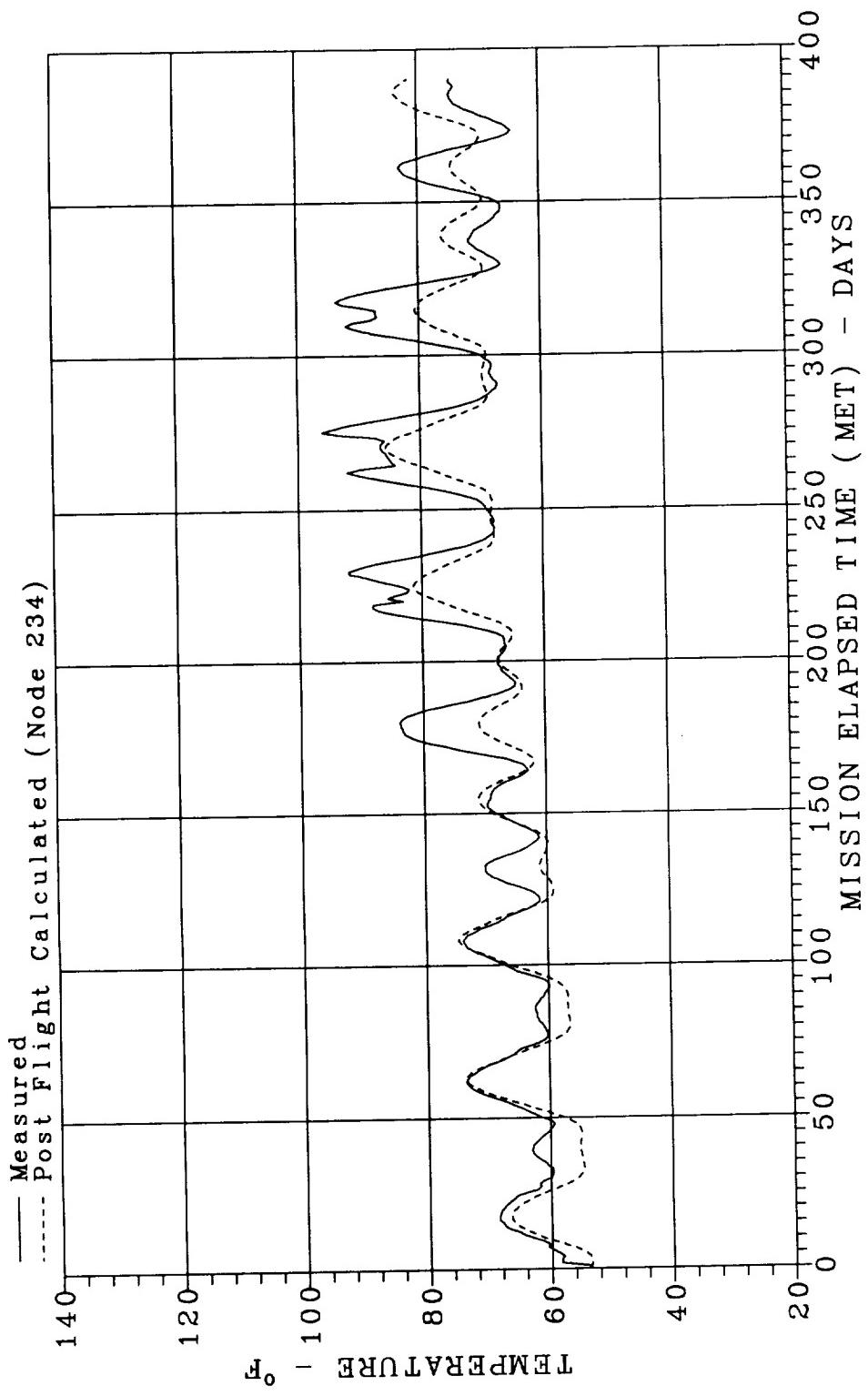


Figure 44 THERM Damper Dome Data vs LDEF Post Flight Thermal Model.

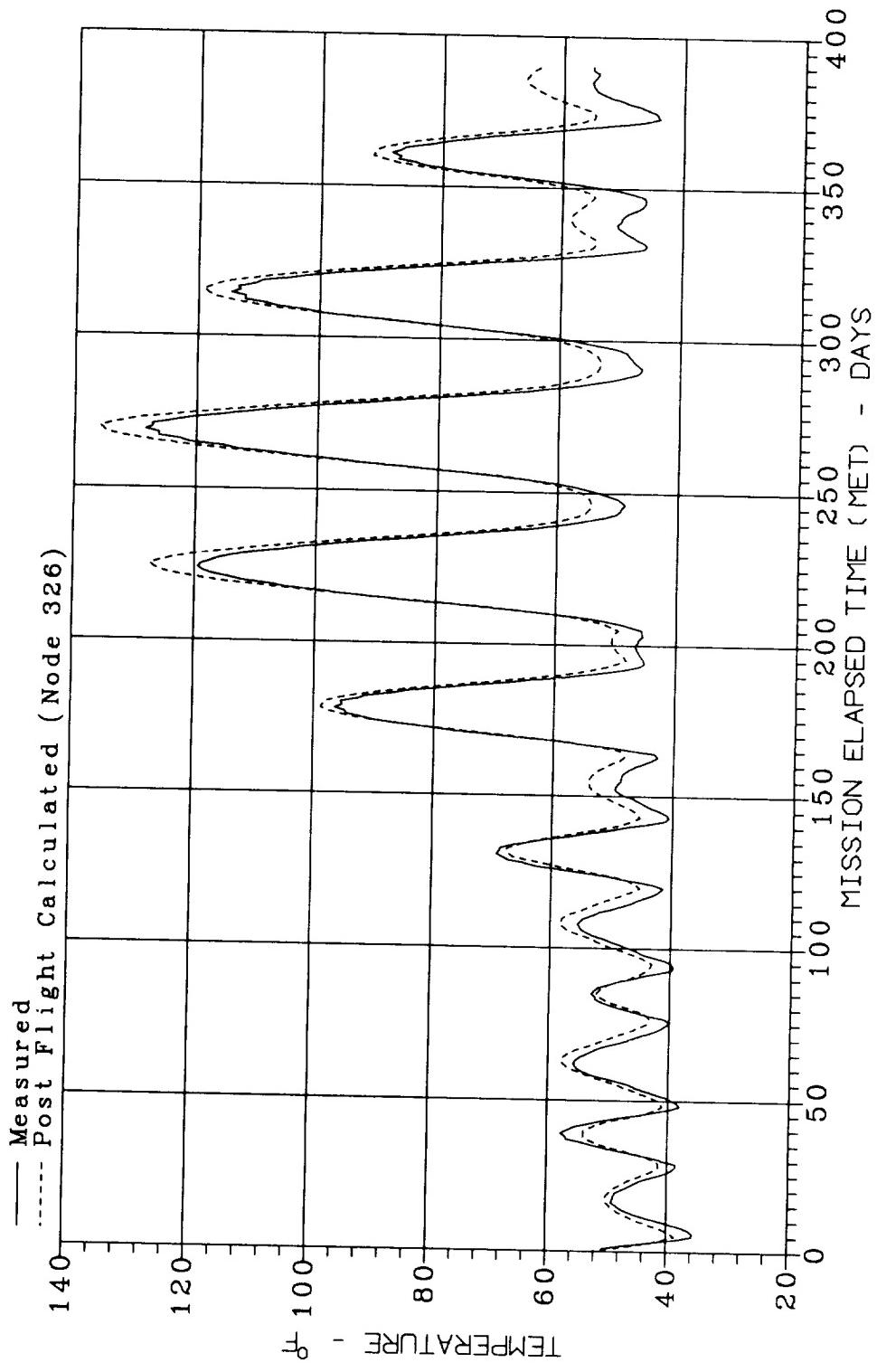


Figure 45 THERM Row 6 Longeron Data vs LDEF Post Flight Thermal Model.

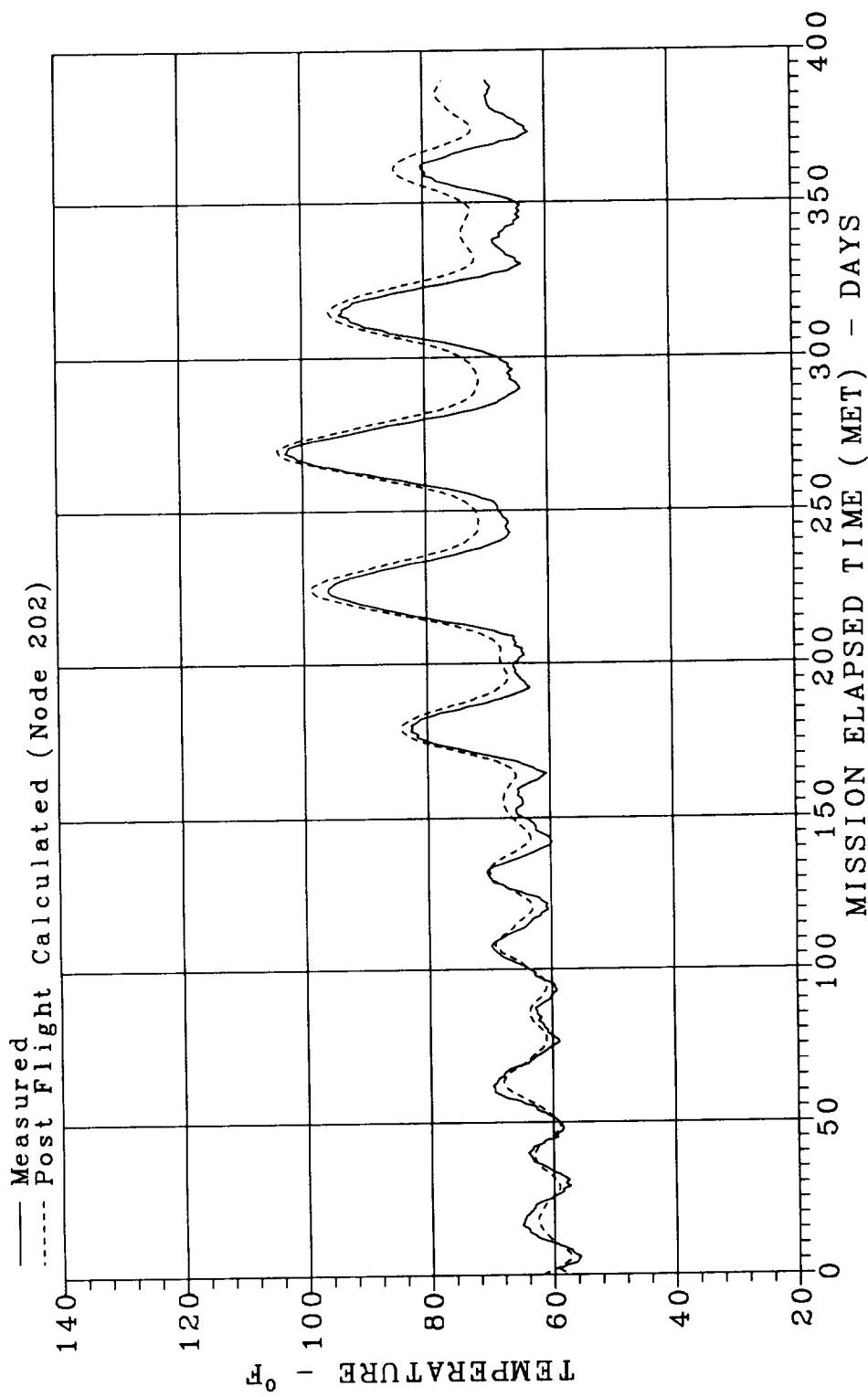


Figure 46 THERM Earth End Data vs LDEF Post Flight Thermal Model.

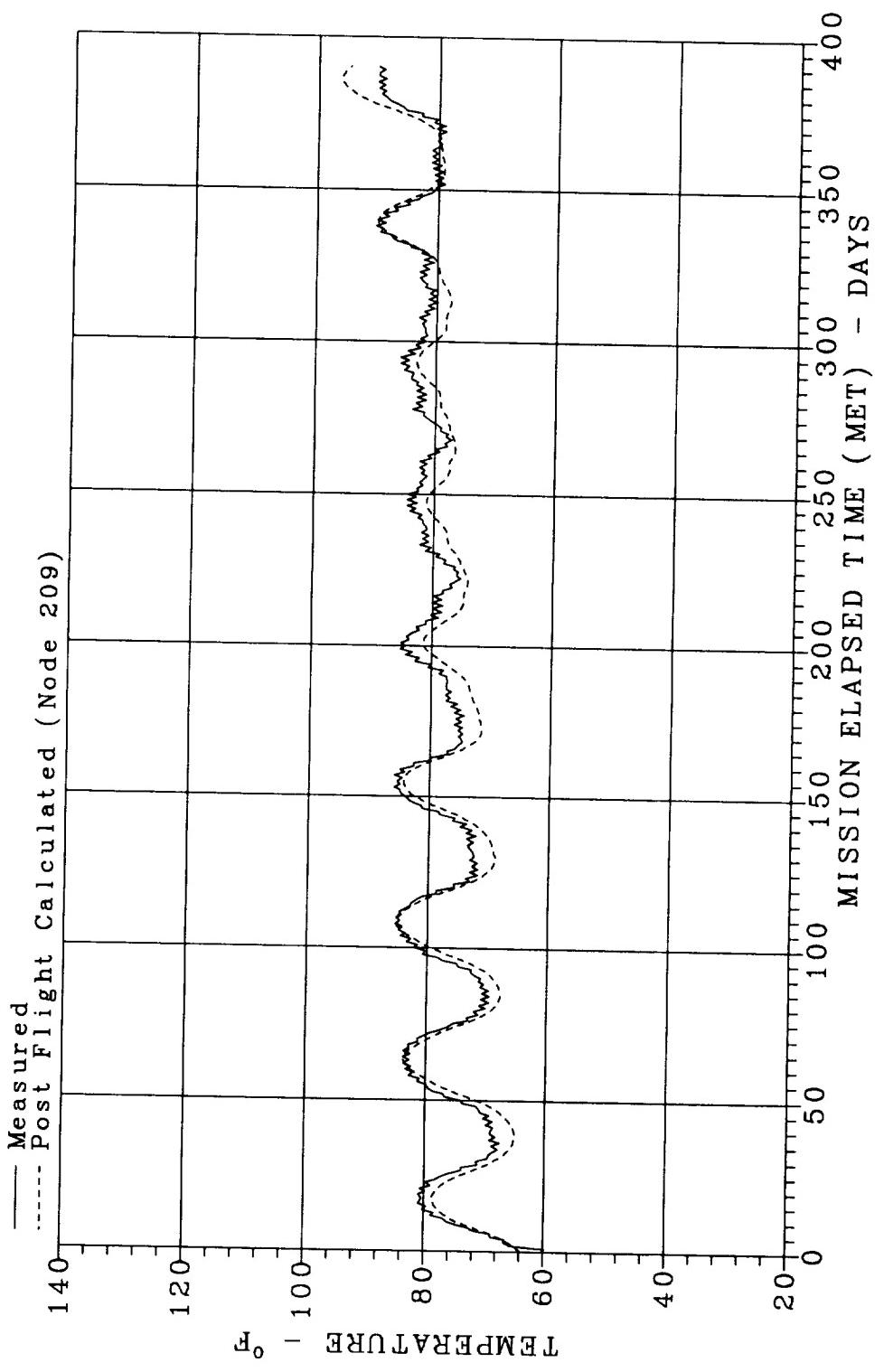


Figure 47 THERM Space End Data vs LDEF Post Flight Thermal Model.

APPENDIX A

ORBITAL INCIDENT HEAT FLUX
> SOLAR, ALBEDO, & PLANET

THERMAL FLUX @ 10° YAW (ALL ROWS/ENDS)

ONE ORBIT DETAILED

- 10° BETA ANGLE INTERVALS

(-52°,-40°,-30°,-20°,-10°,0°,10°,20°,30°,40°,52°)

PLOT  **TABLE** 

This page intentionally left blank

LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
ROW: 1

SOLAR CONSTANT = 434 Btu/Hr- Ft^2
PLANETARY FLUX = 77 Btu/Hr- Ft^2

ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

SOLAR + ALBEDO: 0°

SOLAR + ALBEDO: 10°

SOLAR + ALBEDO: 20°

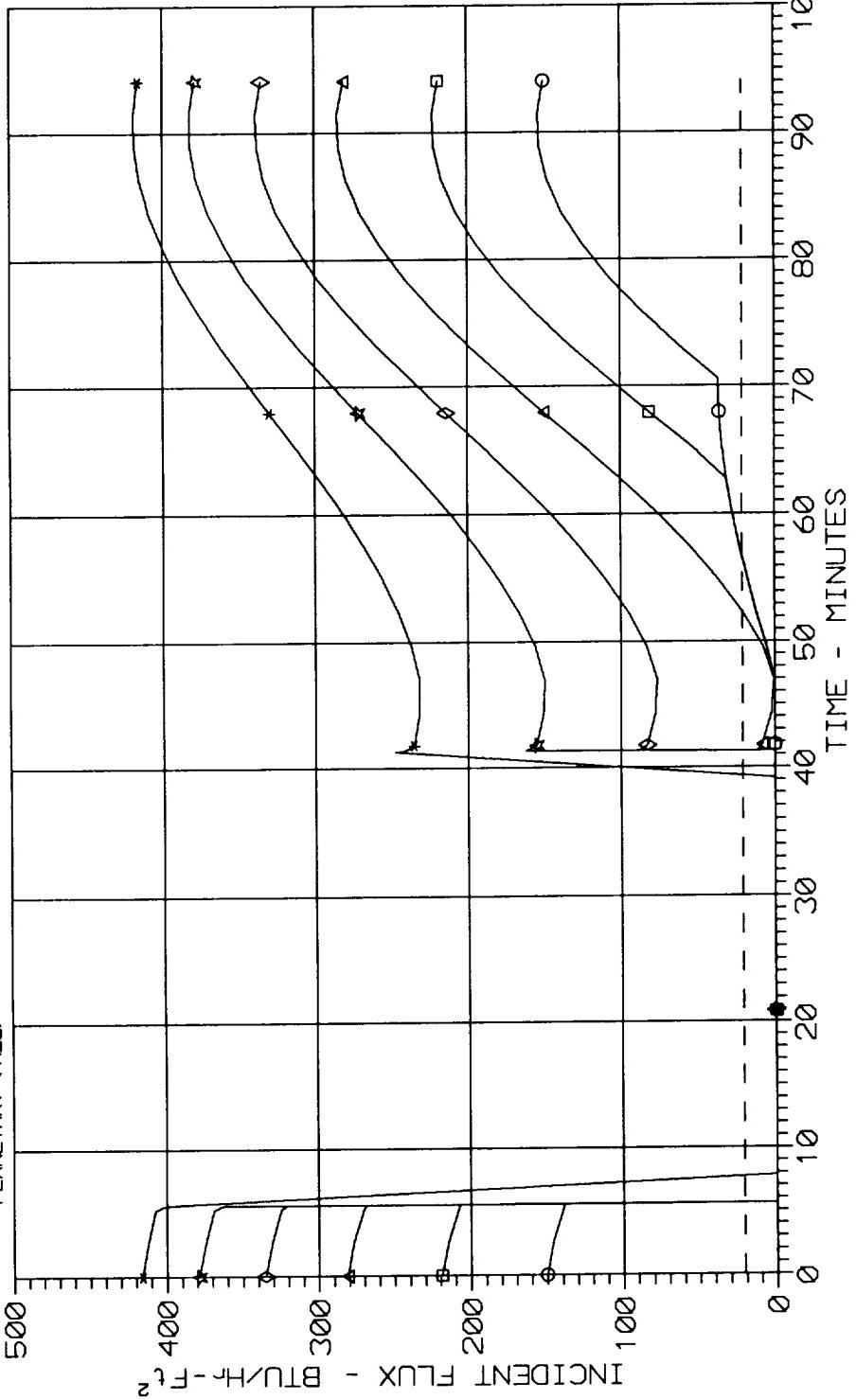
SOLAR + ALBEDO: 30°

SOLAR + ALBEDO: 40°

SOLAR + ALBEDO: 50°

SOLAR + ALBEDO: 52°

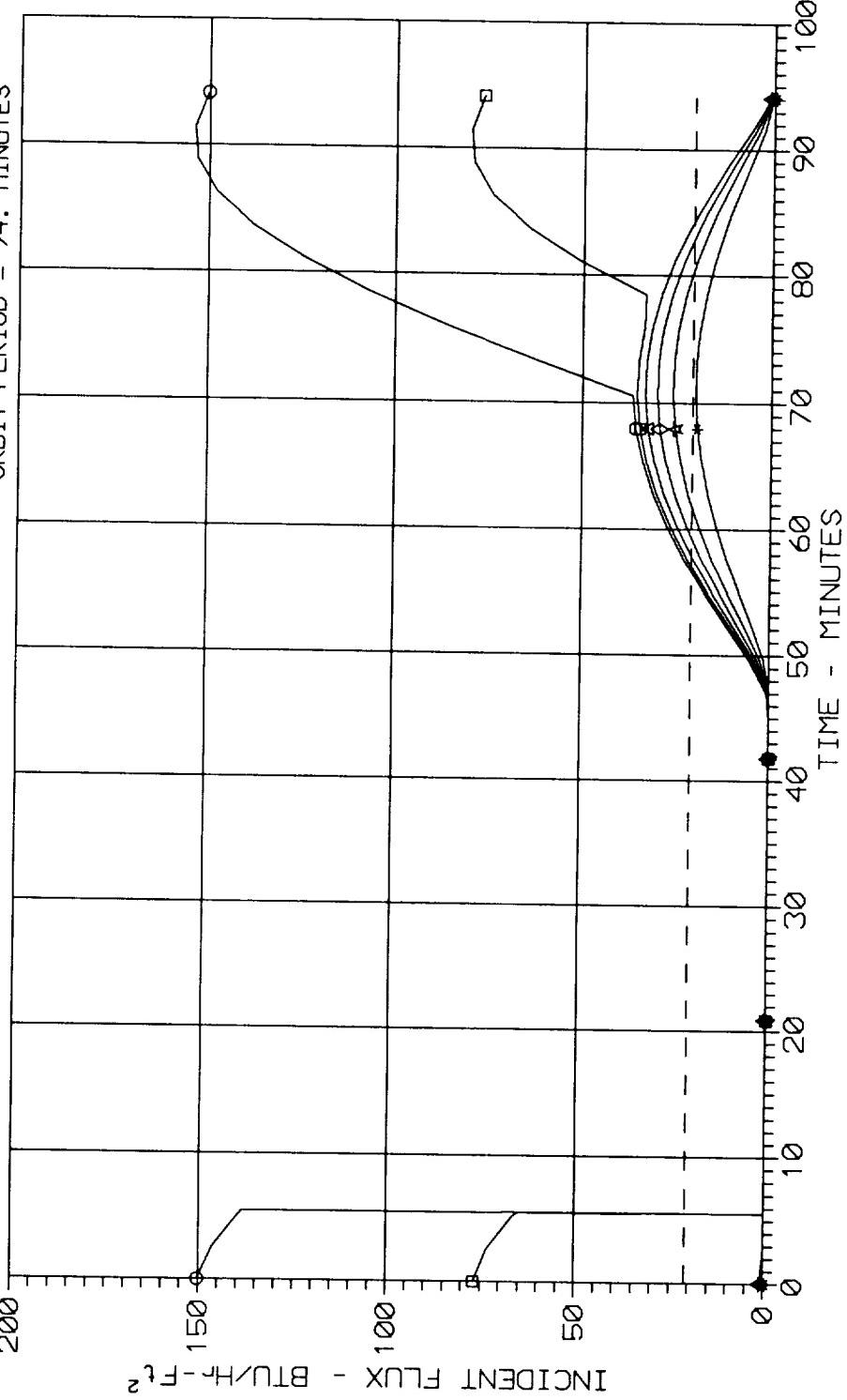
- PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 1

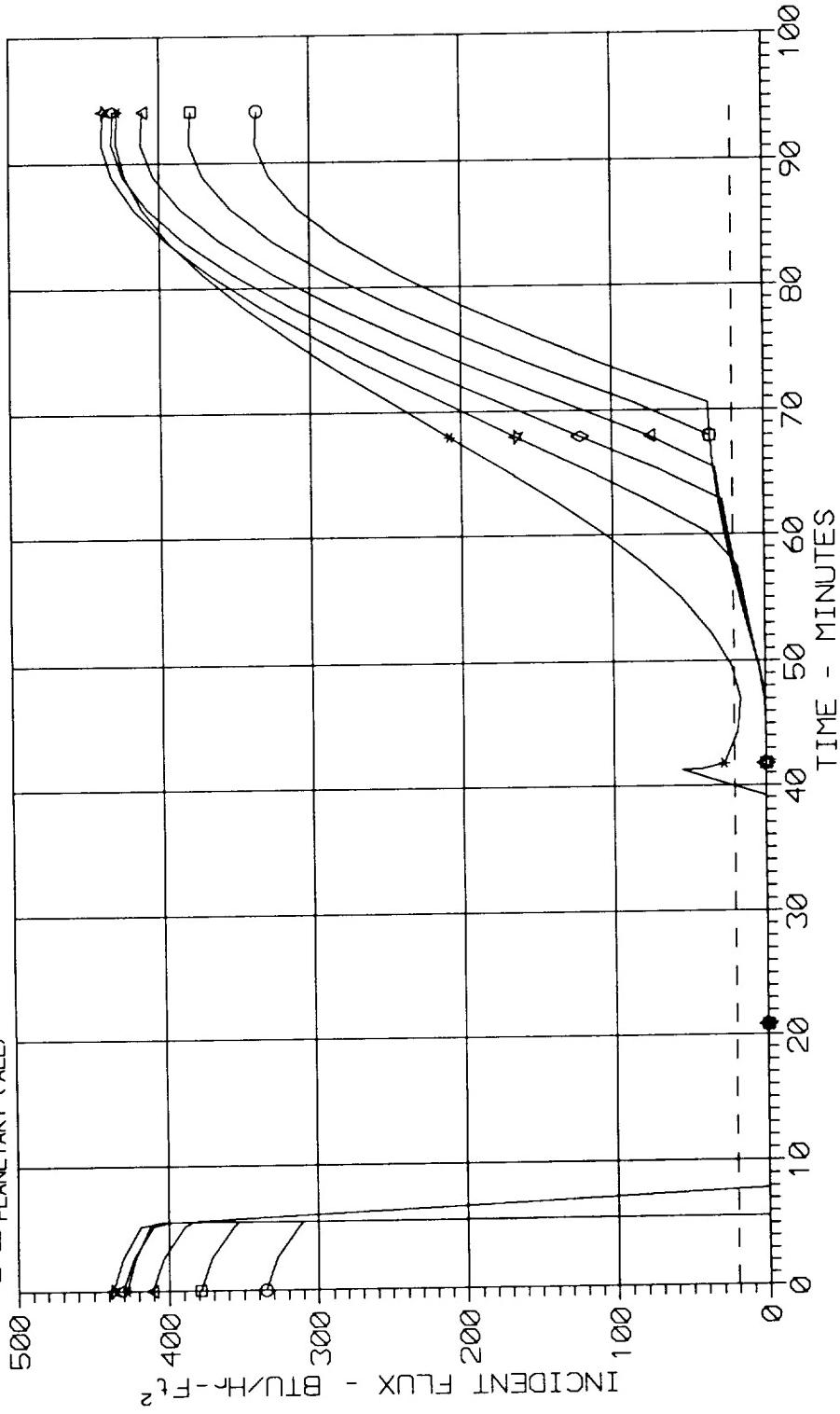
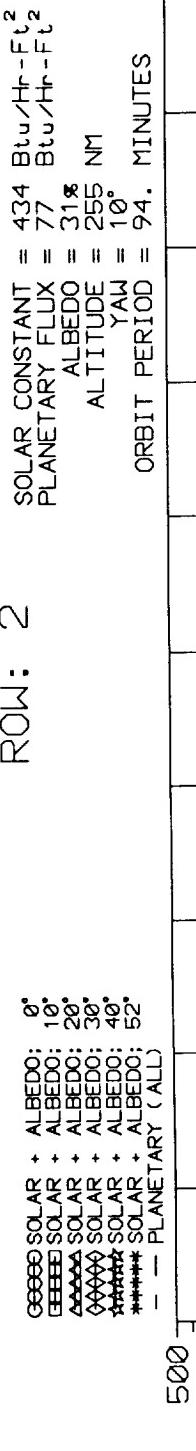
===== SOLAR + ALBEDO;	0°	SOLAR - ALBEDO; -10°
===== SOLAR + ALBEDO;	-10°	SOLAR - ALBEDO; -20°
===== SOLAR + ALBEDO;	-20°	SOLAR - ALBEDO; -30°
===== SOLAR + ALBEDO;	-30°	SOLAR - ALBEDO; -40°
===== SOLAR + ALBEDO;	-40°	SOLAR - ALBEDO; -50°
===== SOLAR + ALBEDO;	-50°	SOLAR - ALBEDO; -52°
- - - - - PLANETARY (ALL)		



LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

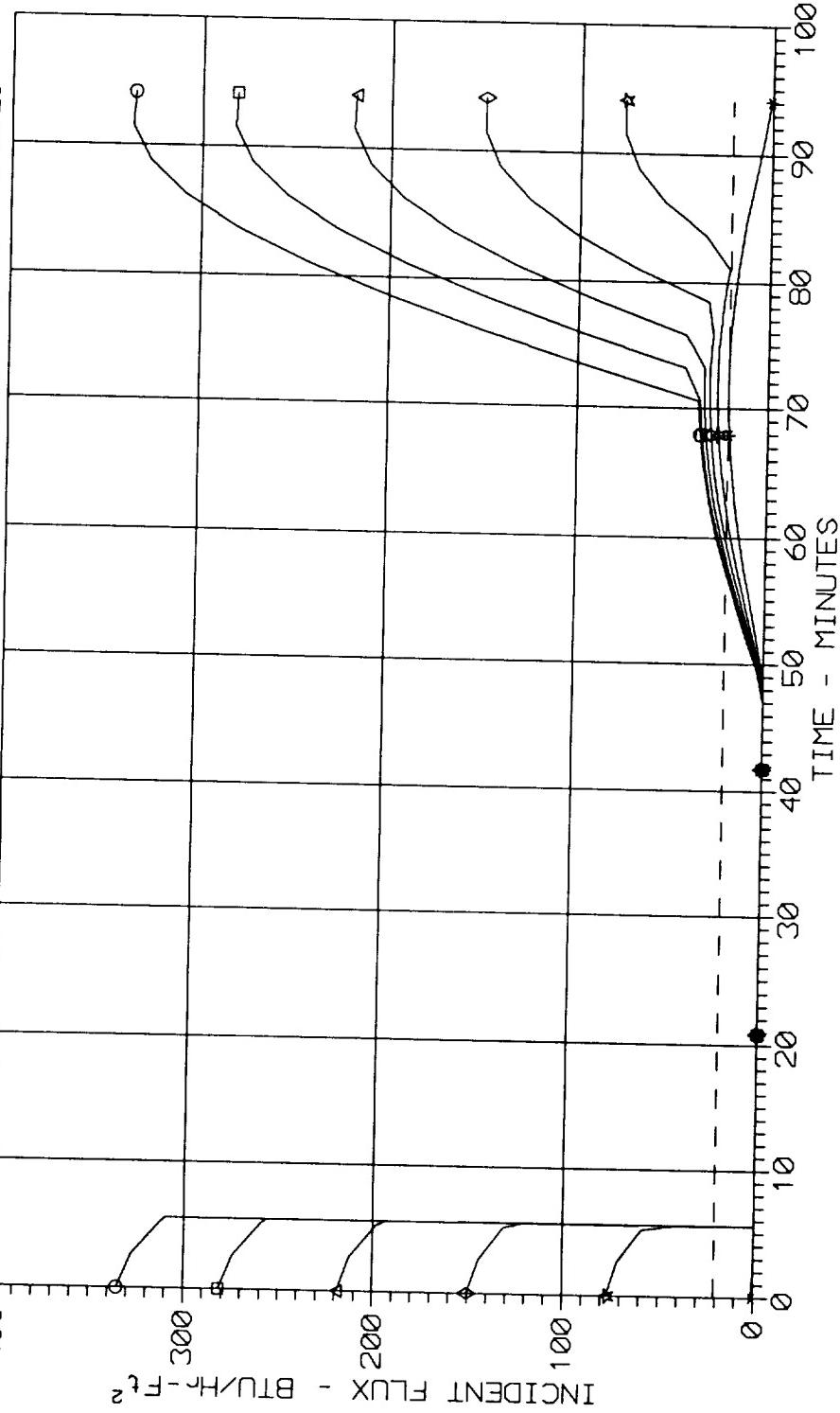
ROW: 2



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 2

SOLAR ALBEDO: 0°
 SOLAR ALBEDO: -10°
 SOLAR ALBEDO: -20°
 SOLAR ALBEDO: -30°
 SOLAR ALBEDO: -40°
 SOLAR ALBEDO: -52°
 - - PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 3

SOLAR CONSTANT = 434 Btu/Hr- ft^2

PLANETARY FLUX = 77 Btu/Hr- ft^2

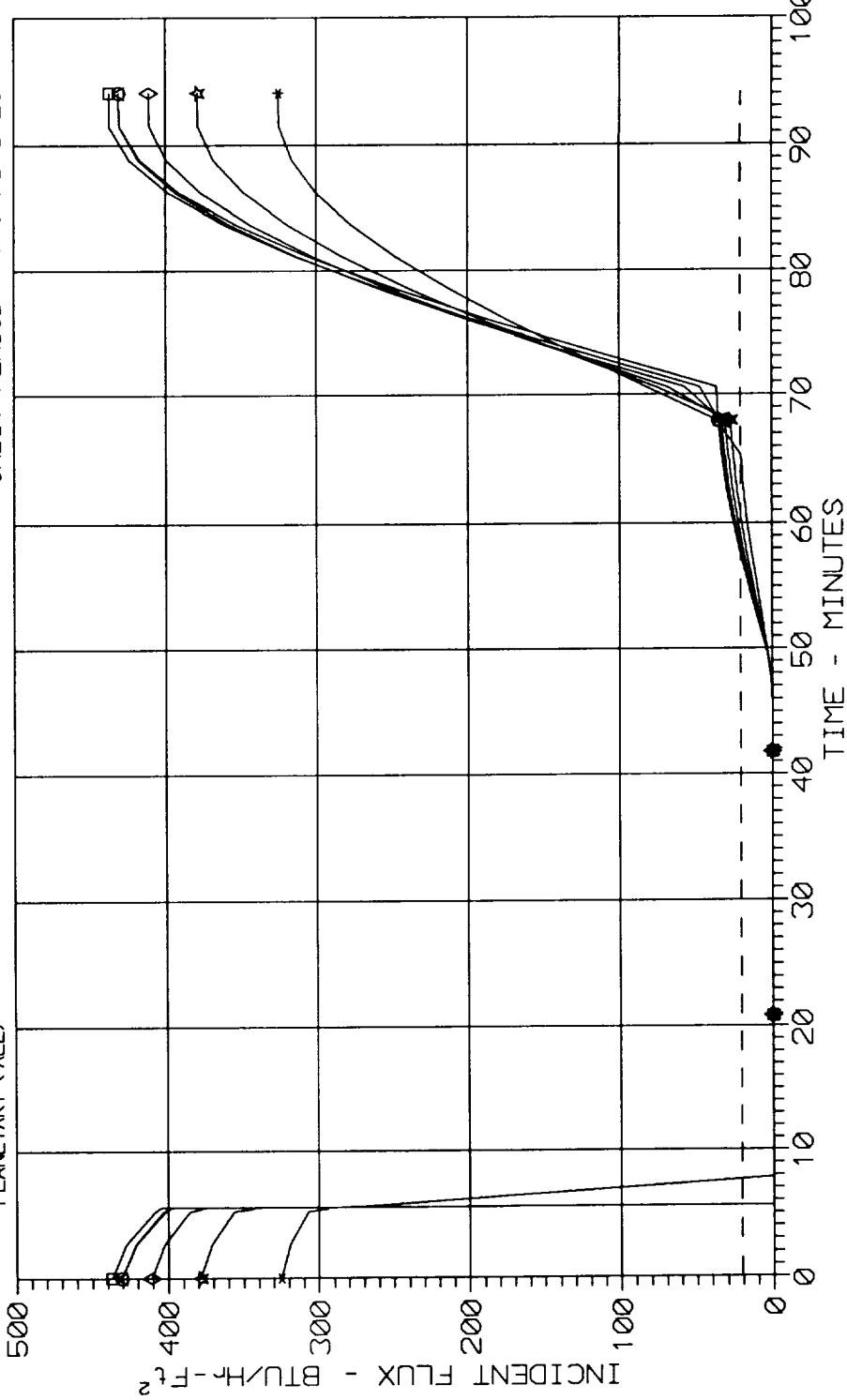
ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

===== SOLAR + ALBEDO: 0°
 ===== SOLAR + ALBEDO: 10°
 ===== SOLAR + ALBEDO: 20°
 ===== SOLAR + ALBEDO: 30°
 ===== SOLAR + ALBEDO: 40°
 ===== SOLAR + ALBEDO: 52°
 - - - - - PLANETARY (ALL)

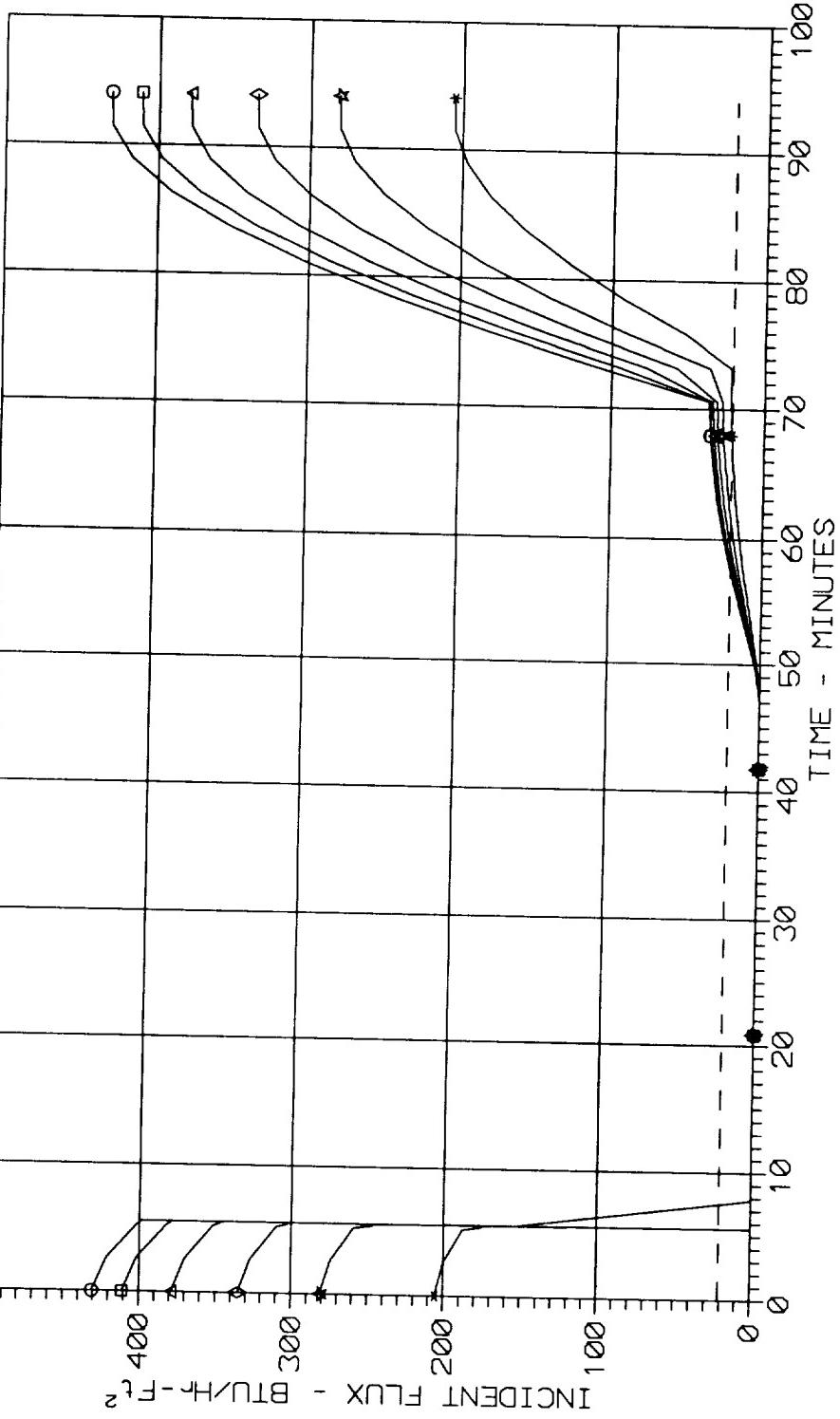


LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 3

SOLAR ALBEDO: 0°
 SOLAR ALBEDO: -10°
 SOLAR ALBEDO: -20°
 SOLAR ALBEDO: -30°
 SOLAR ALBEDO: -40°
 SOLAR ALBEDO: -50°
 PLANETARY (ALL)

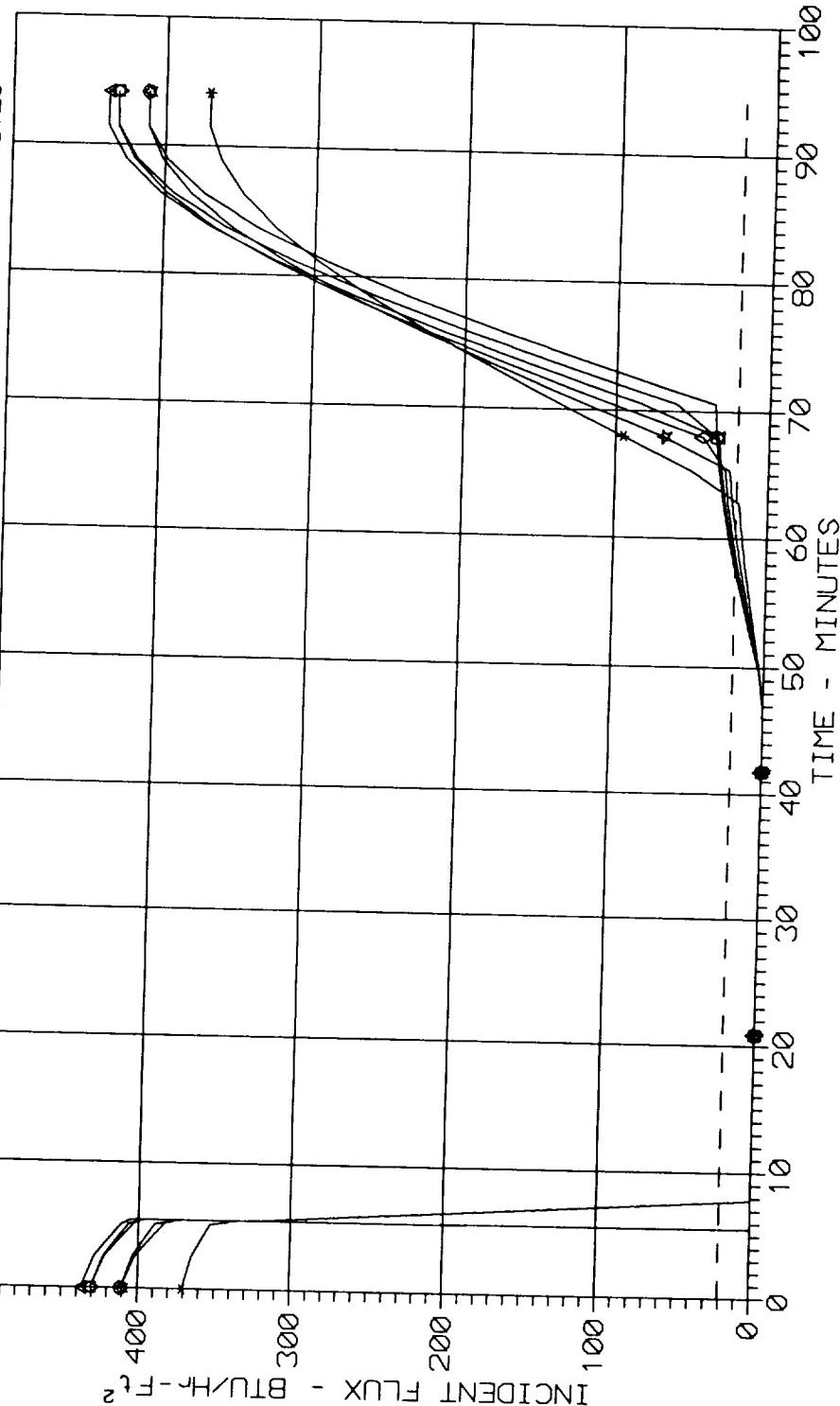
SOLAR CONSTANT = 434 Btu/Hr- Ft^2
 PLANETARY FLUX = 77 Btu/Hr- Ft^2
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°
 ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 4

SOLAR ALBEDO:	-0°	SOLAR CONSTANT = 434 Btu/Hr - Ft ²
SOLAR ALBEDO:	-10°	PLANETARY FLUX = 77 Btu/Hr - Ft ²
SOLAR ALBEDO:	-20°	ALBEDO = 31%
SOLAR ALBEDO:	-30°	ALTITUDE = 255 NM
SOLAR ALBEDO:	-40°	YAW = 10°
SOLAR ALBEDO:	-52°	
- - - PLANETARY (ALL)		ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 4

SOLAR ALBEDO: 0°

SOLAR ALBEDO: 10°

SOLAR ALBEDO: 20°

SOLAR ALBEDO: 30°

SOLAR ALBEDO: 40°

SOLAR ALBEDO: 50°

SOLAR ALBEDO: 52°

- - PLANETARY (ALL)

SOLAR CONSTANT = 434 Btu/Hr- ft^2

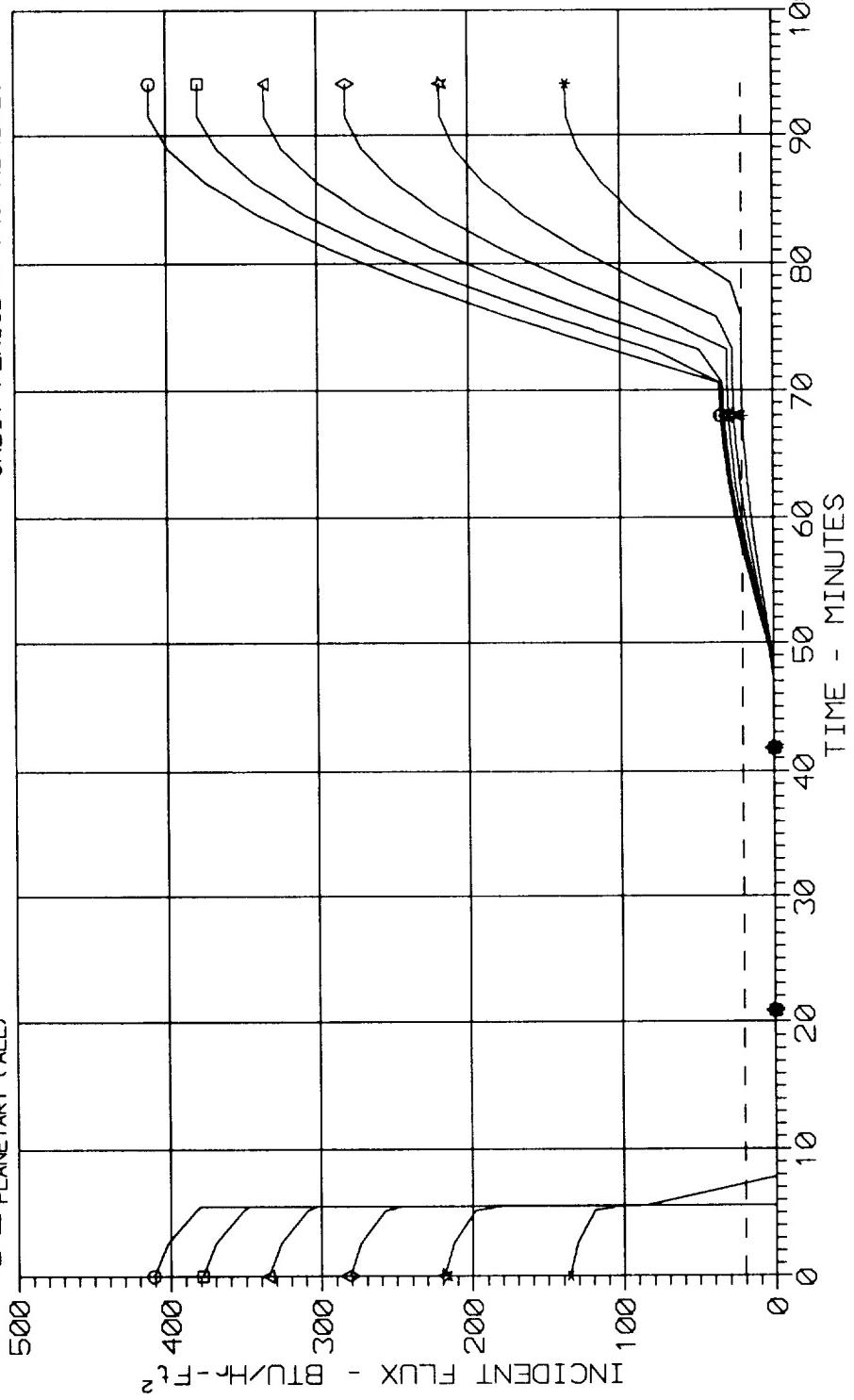
PLANETARY FLUX = 77 Btu/Hr- ft^2

ALBEDO = 31% NM

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 5 SOLAR CONSTANT = 434 Btu/Hr- Ft^2
 PLANETARY FLUX = 77 Btu/Hr- Ft^2

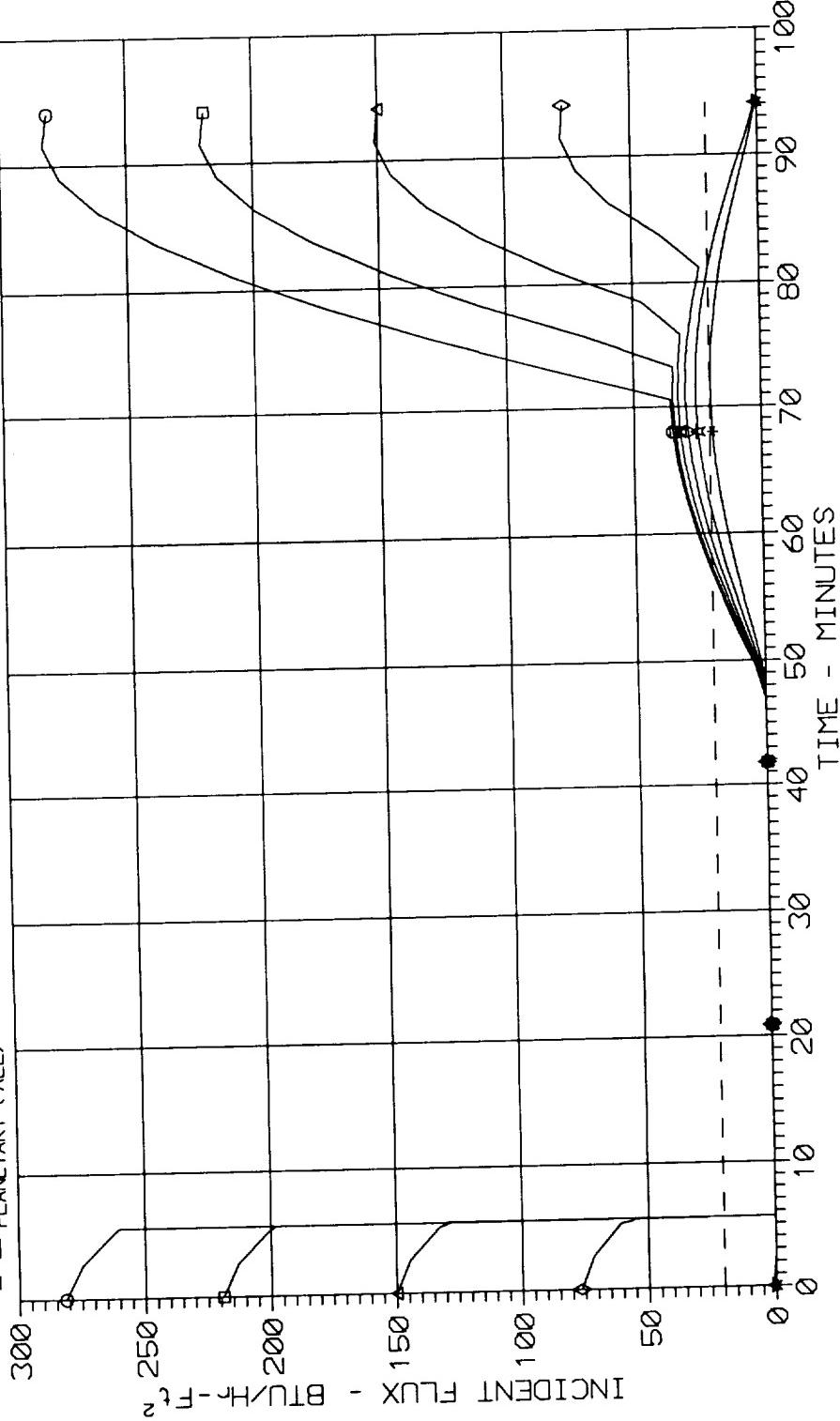
ALBEDO = 31%

ALTITUDE = 255 NM

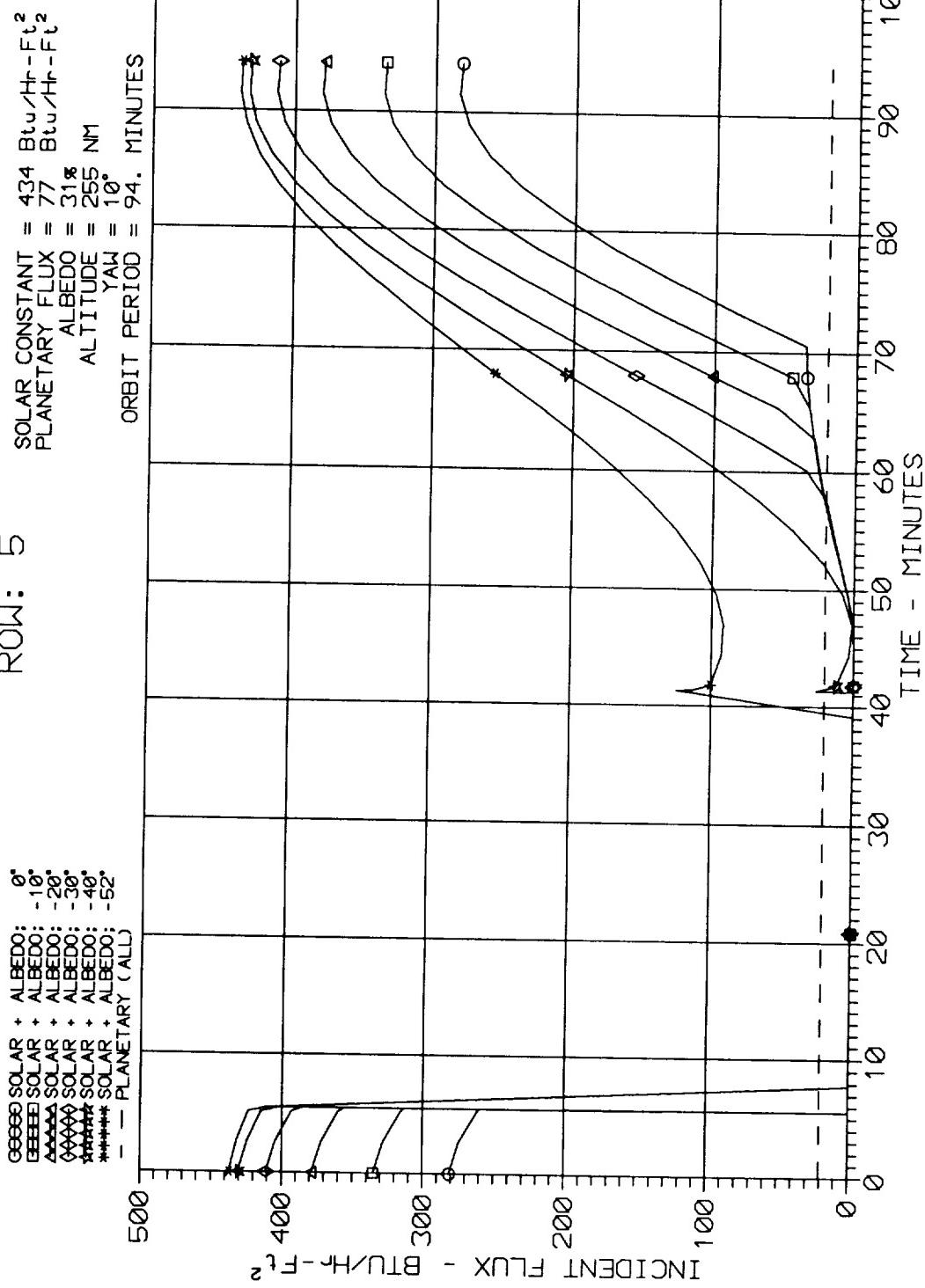
YAW = 10°

ORBIT PERIOD = 94. MINUTES

SOLAR ALBEDO: 0°
 SOLAR ALBEDO: 10°
 SOLAR ALBEDO: 20°
 SOLAR ALBEDO: 30°
 SOLAR ALBEDO: 40°
 SOLAR ALBEDO: 52°
 - PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
ROW: 5

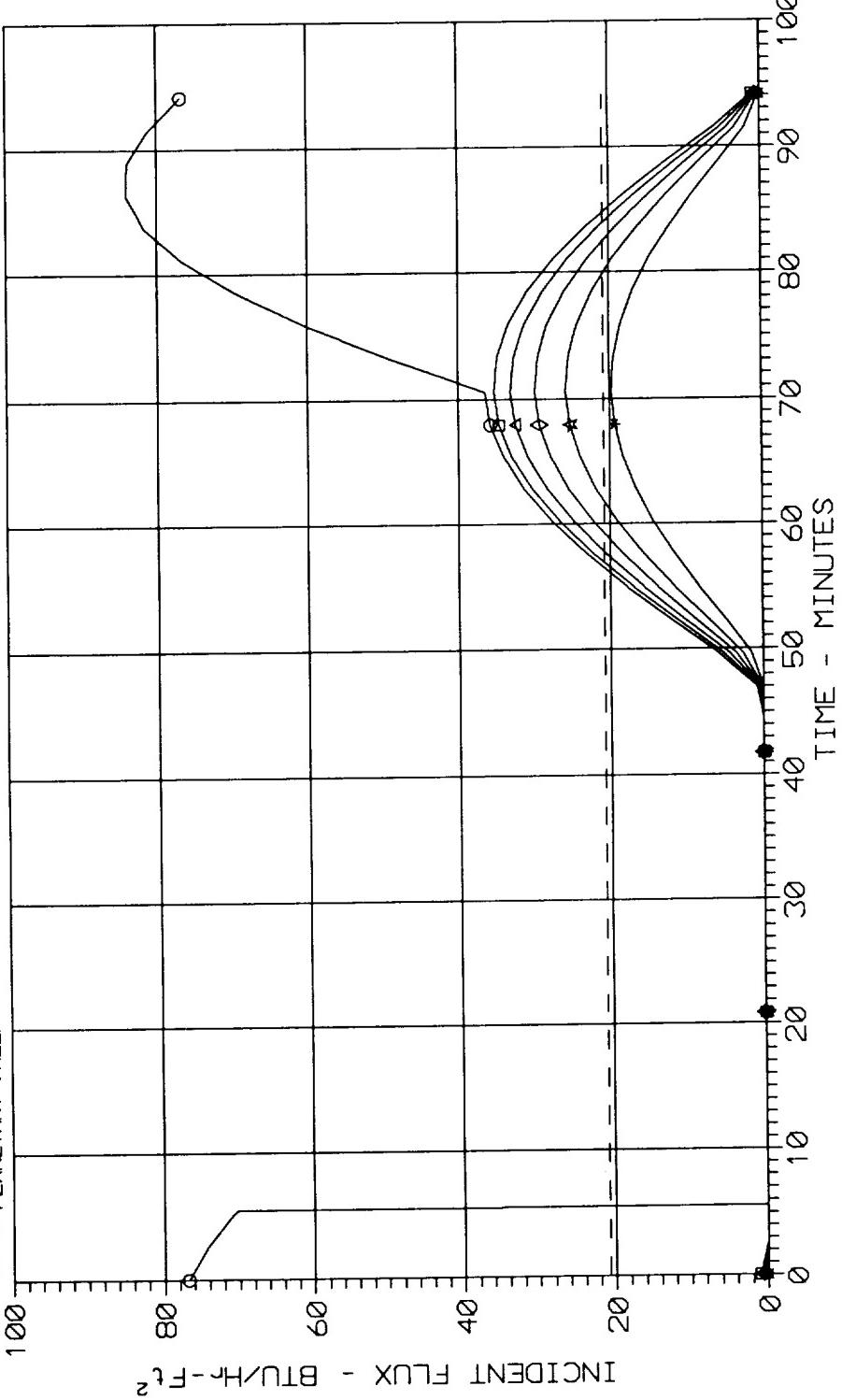


LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 6

SOLAR CONSTANT = 434 Btu/Hr- ft^2
 PLANETARY FLUX = 77 Btu/Hr- ft^2
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°
 ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 6

SOLAR CONSTANT = 434 Btu/Hr - Ft²
 PLANETARY FLUX = 77 Btu/Hr - Ft²

ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

SOLAR + ALBEDO: 0°
 SOLAR + ALBEDO: -10°
 SOLAR + ALBEDO: -20°
 SOLAR + ALBEDO: -30°
 SOLAR + ALBEDO: -40°
 SOLAR + ALBEDO: -50°
 - PLANETARY (ALL)

400

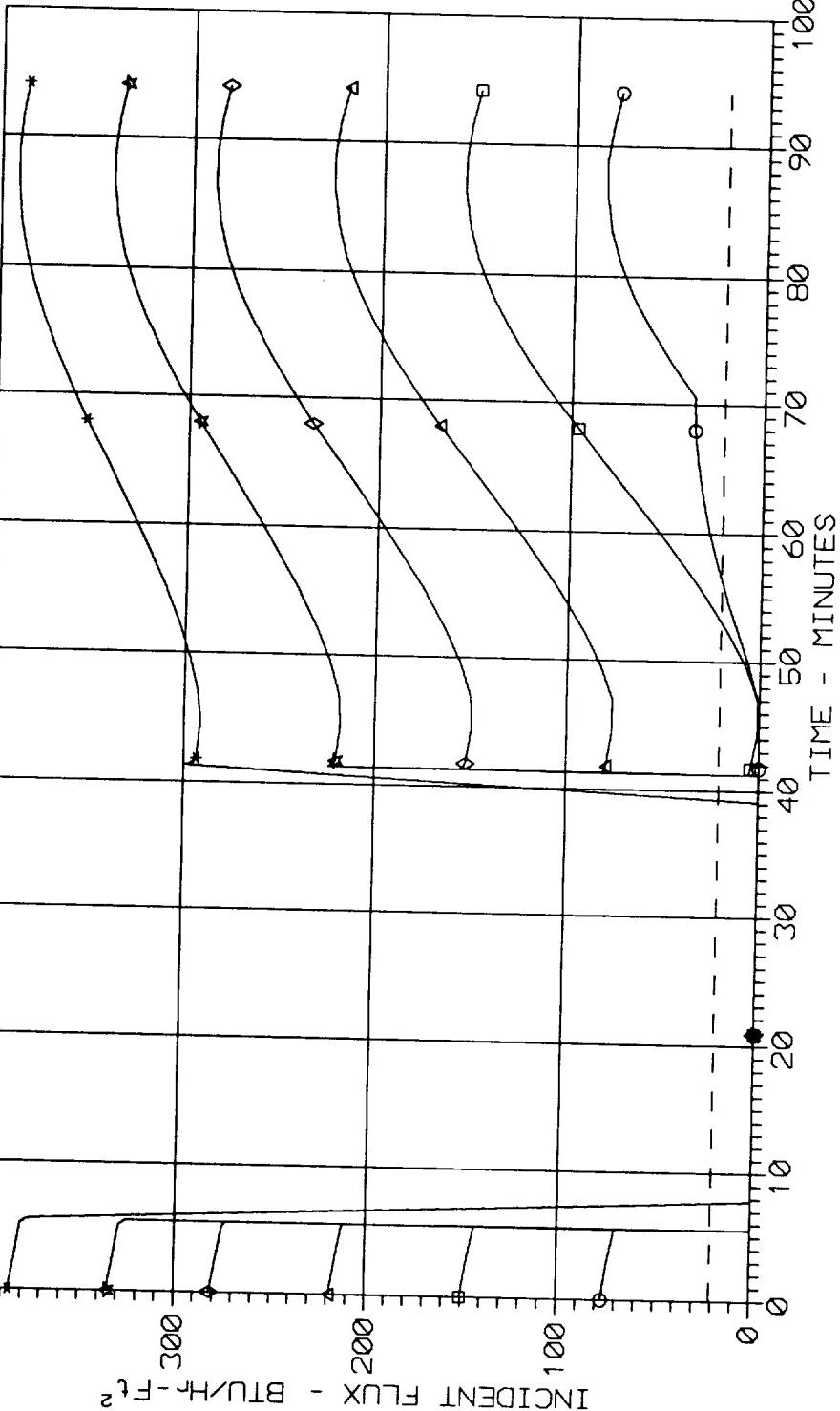
300

200

100

0

INCIDENT FLUX - Btu/Hr - Ft²



LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

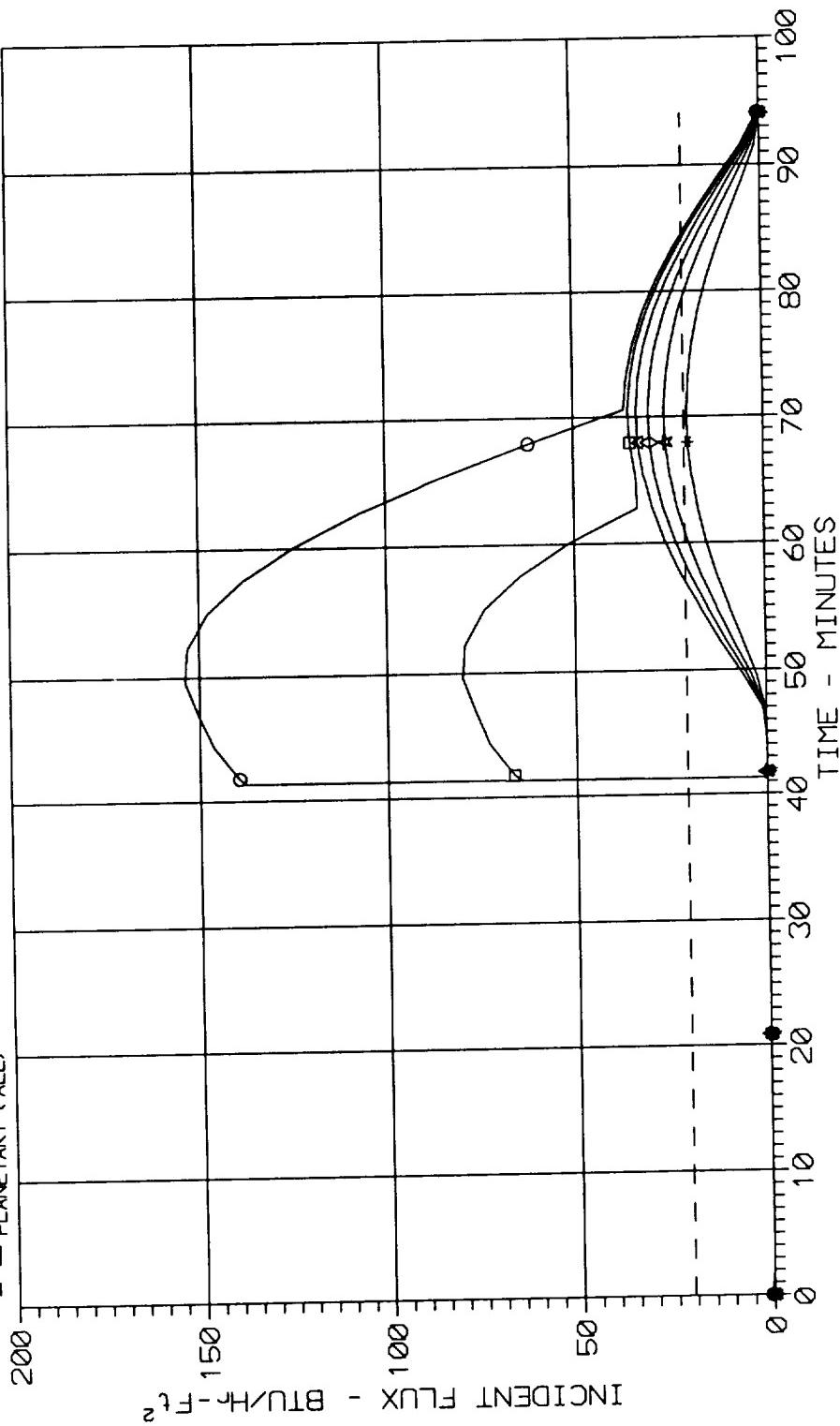
ROW: 7

SOLAR CONSTANT = 434 Btu/Hr- ft^2
 PLANETARY FLUX = 77 Btu/Hr- ft^2

ALBEDO = 31% NM
 ALTITUDE = 255 NM

YAW = 10°
 ORBIT PERIOD = 94. MINUTES

OOOO SOLAR + ALBEDO: 0°
 OOOE SOLAR ++ ALBEDO: 10°
 OAAA SOLAR ++ ALBEDO: 20°
 OOOO SOLAR ++ ALBEDO: 30°
 OOOA SOLAR ++ ALBEDO: 40°
 OOO*** SOLAR ++ ALBEDO: 50°
 - - - - - PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
ROW: 7

SOLAR + ALBEDO: 0°
 SOLAR + ALBEDO: -10°
 SOLAR + ALBEDO: -20°
 SOLAR + ALBEDO: -30°
 SOLAR + ALBEDO: -40°
 SOLAR + ALBEDO: -52°
 - PLANETARY (ALL)

SOLAR CONSTANT = 434 Btu/Hr- F_t^2

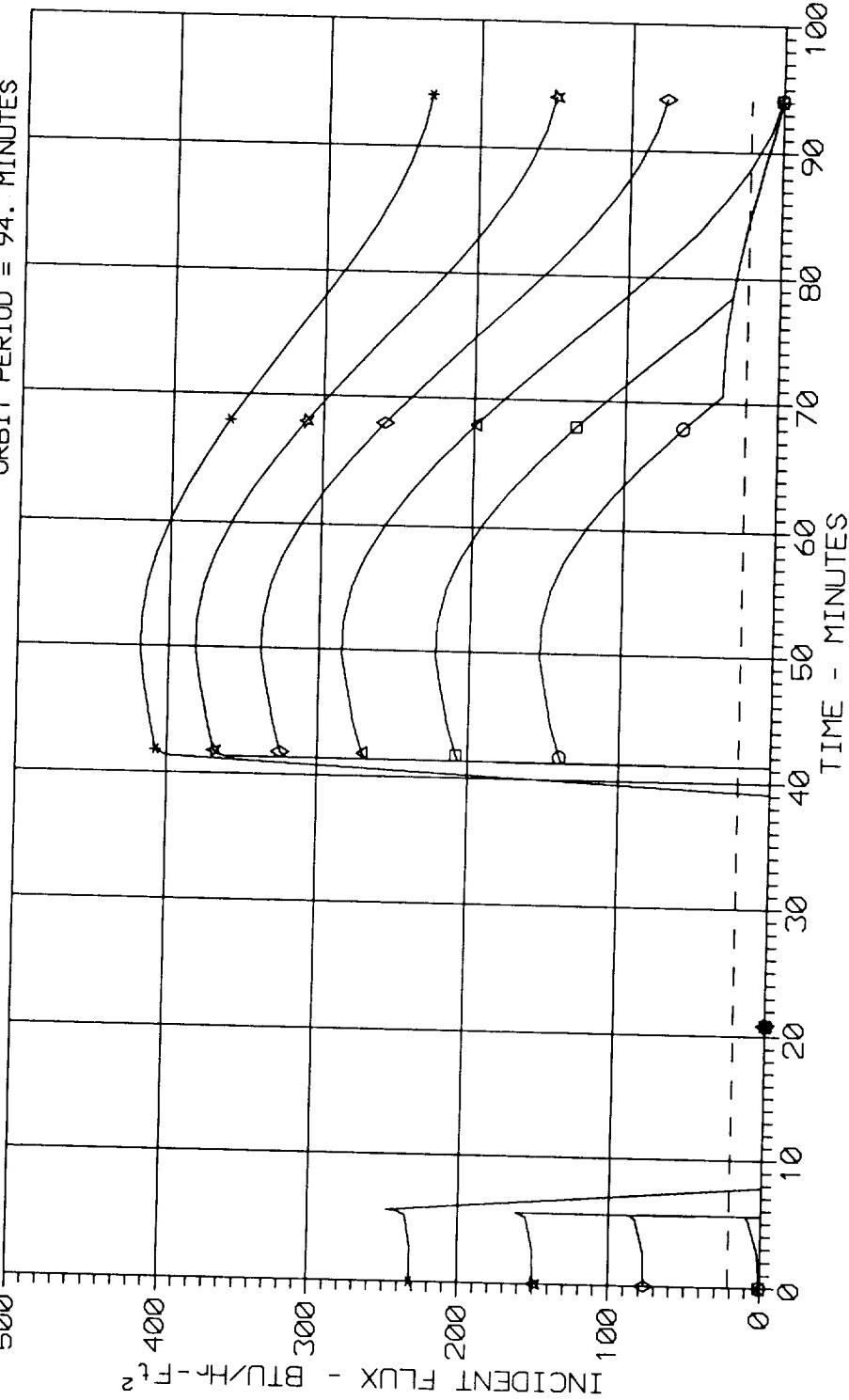
PLANETARY FLUX = 77 Btu/Hr- F_t^2

ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

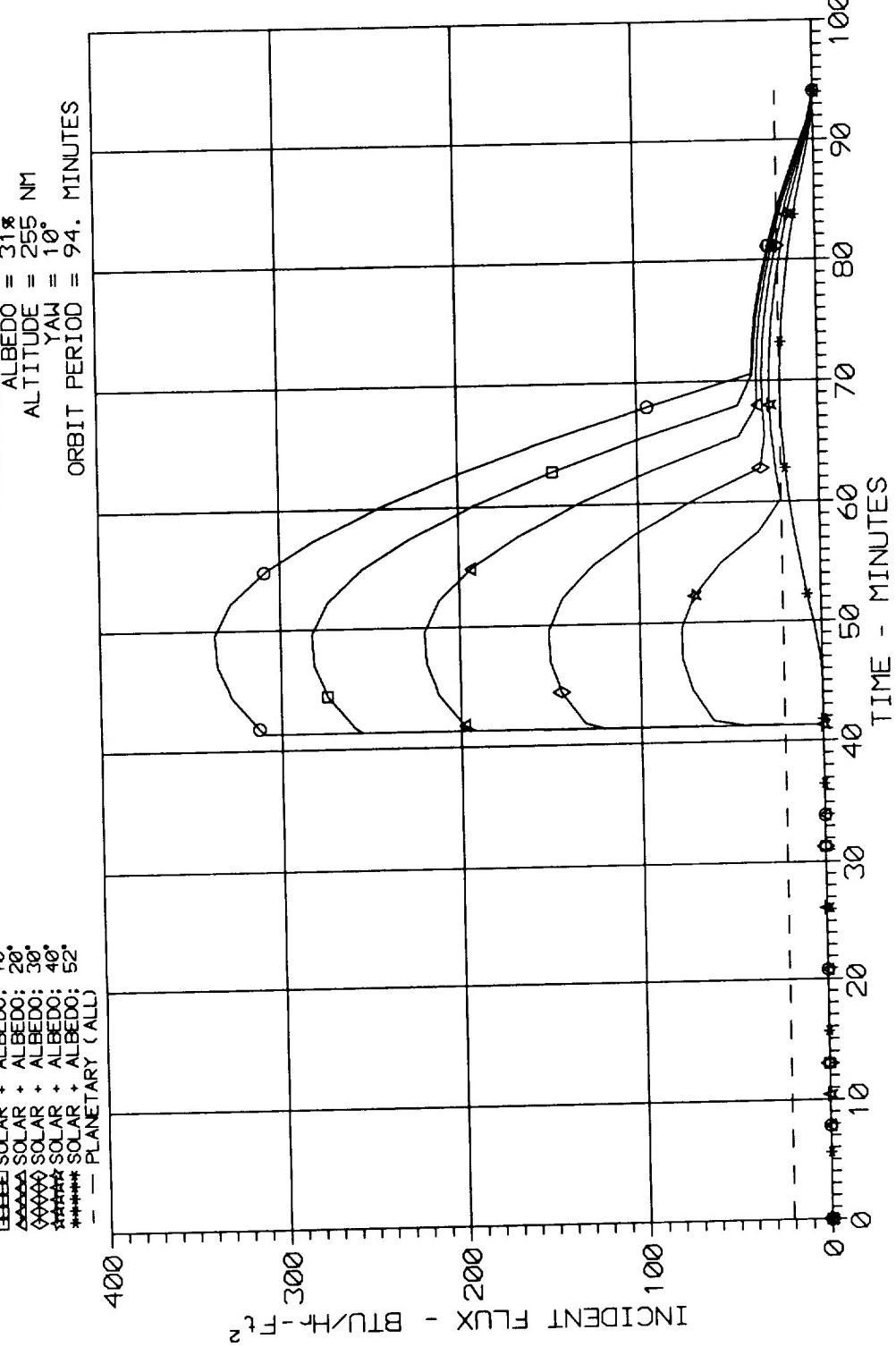


LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 8

SOLAR ALBEDO: 0°
SOLAR ALBEDO: 10°
SOLAR ALBEDO: 20°
SOLAR ALBEDO: 30°
SOLAR ALBEDO: 40°
SOLAR ALBEDO: 52°
— PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 8

SOLAR CONSTANT = 434 Btu/Hr- ft^2
 PLANETARY FLUX = 77 Btu/Hr- ft^2

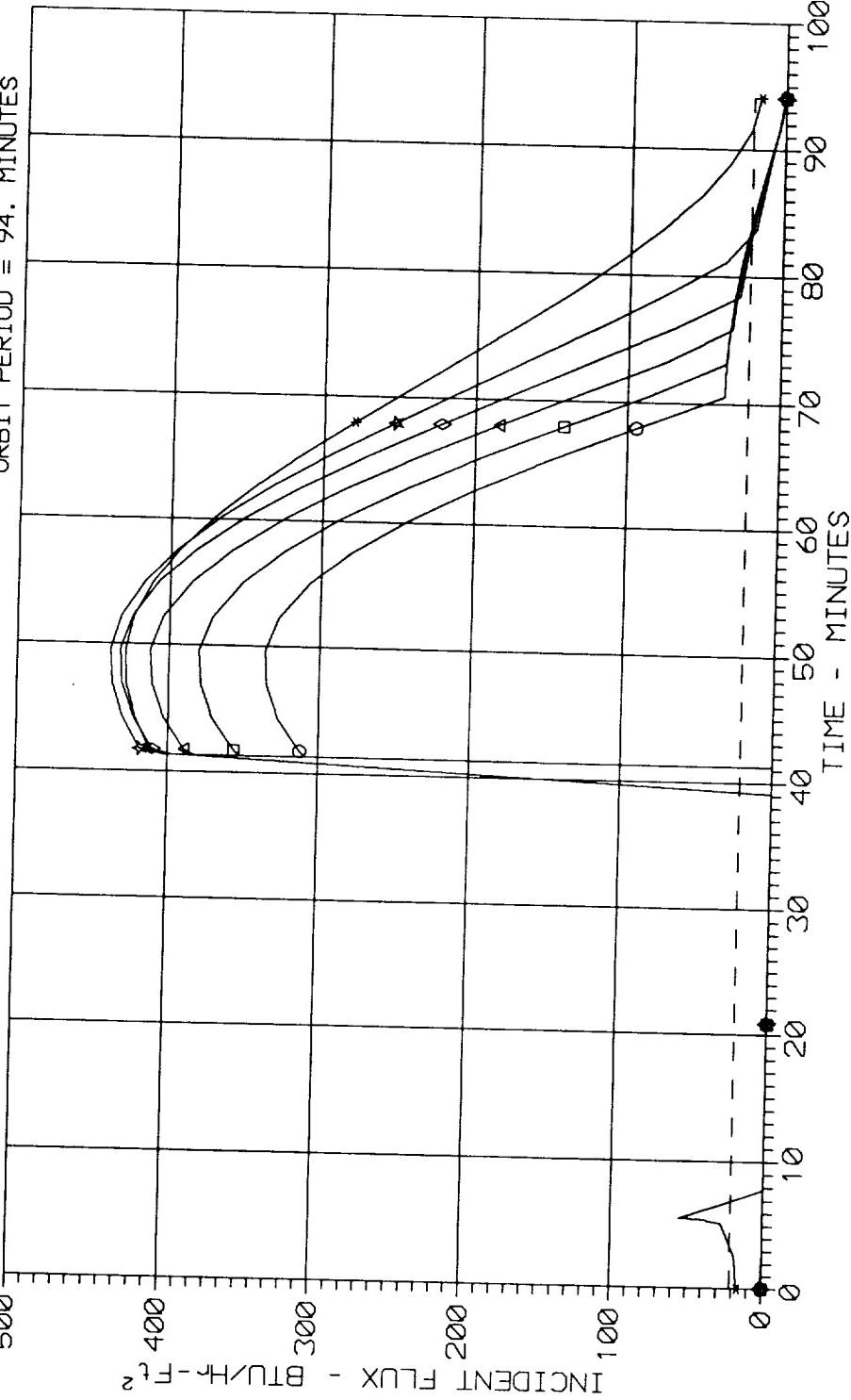
ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

ALBEDO: 0°
 SOLAR + ALBEDO: -10°
 SOLAR + ALBEDO: -20°
 SOLAR + ALBEDO: -30°
 SOLAR + ALBEDO: -40°
 SOLAR + ALBEDO: -50°
 SOLAR + ALBEDO: -52°
 PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
ROW: 9

SOLAR CONSTANT = 434 Btu/Hr-Ft^2

PLANETARY FLUX = 77 Btu/Hr-Ft^2

ALBEDO = 31.8%

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

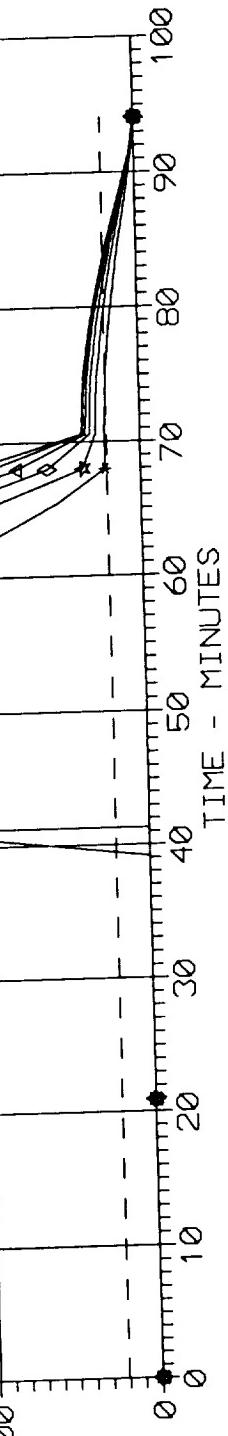
SOLAR ALBEDO:
 + 0°
 * 10°
 □ 20°
 ▲ 30°
 × 40°
 × 48°
 × 52°
 - PLANETARY (ALL)

500

400
300
200

100

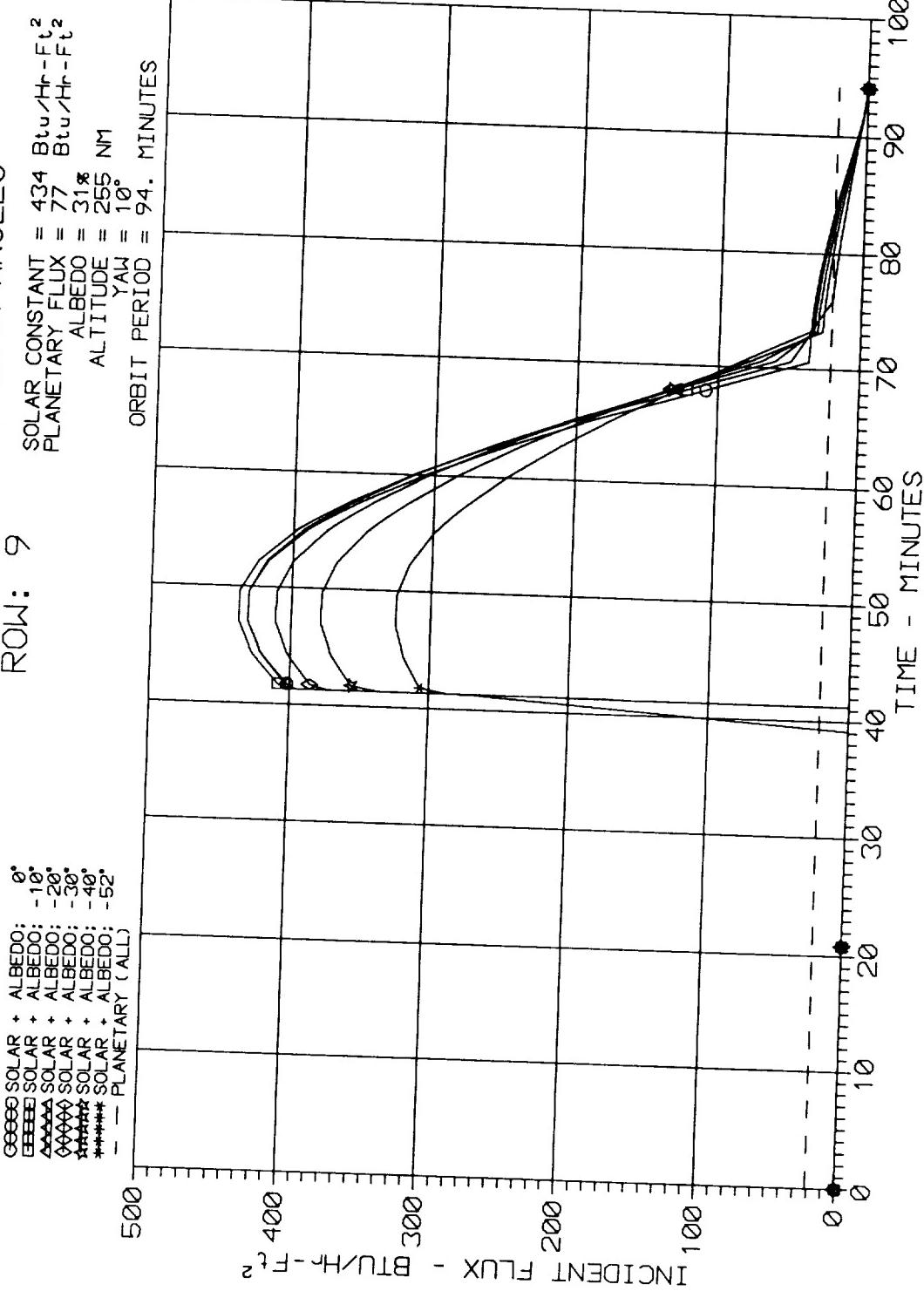
INCIDENT FLUX - BTU/Hr-Ft²



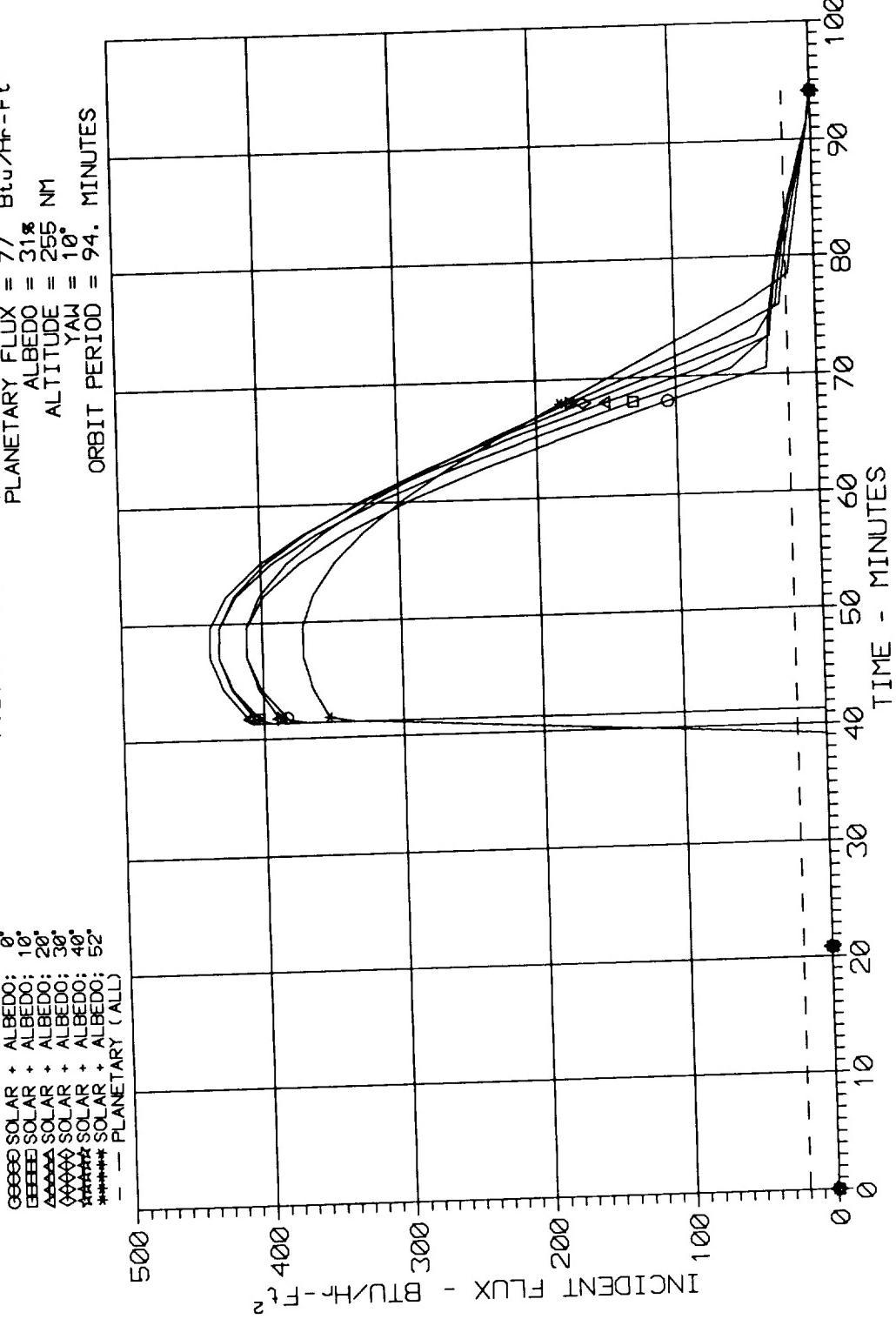
LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 9



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
ROW: 10



LONG DURATION EXPOSURE FACILITY

ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES

ROW: 10

SOLAR + ALBEDO: 0°
 SOLAR + ALBEDO: -10°
 SOLAR + ALBEDO: -20°
 SOLAR + ALBEDO: -30°
 SOLAR + ALBEDO: -40°
 SOLAR + ALBEDO: -52°
 - PLANETARY (ALL)

SOLAR CONSTANT = 434 Btu/Hr- Ft^2

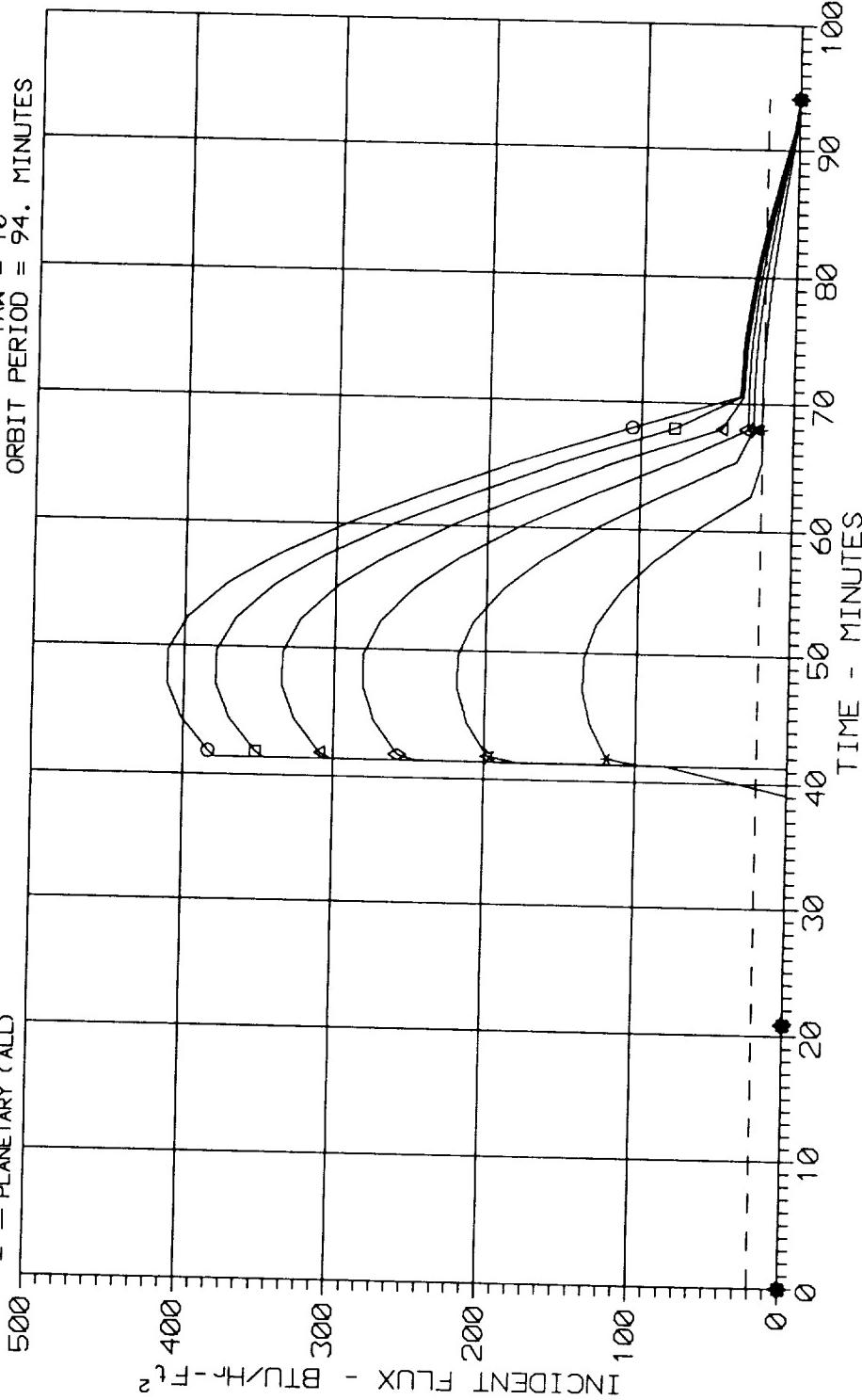
PLANETARY FLUX = 77 Btu/Hr- Ft^2

ALBEDO = 31%

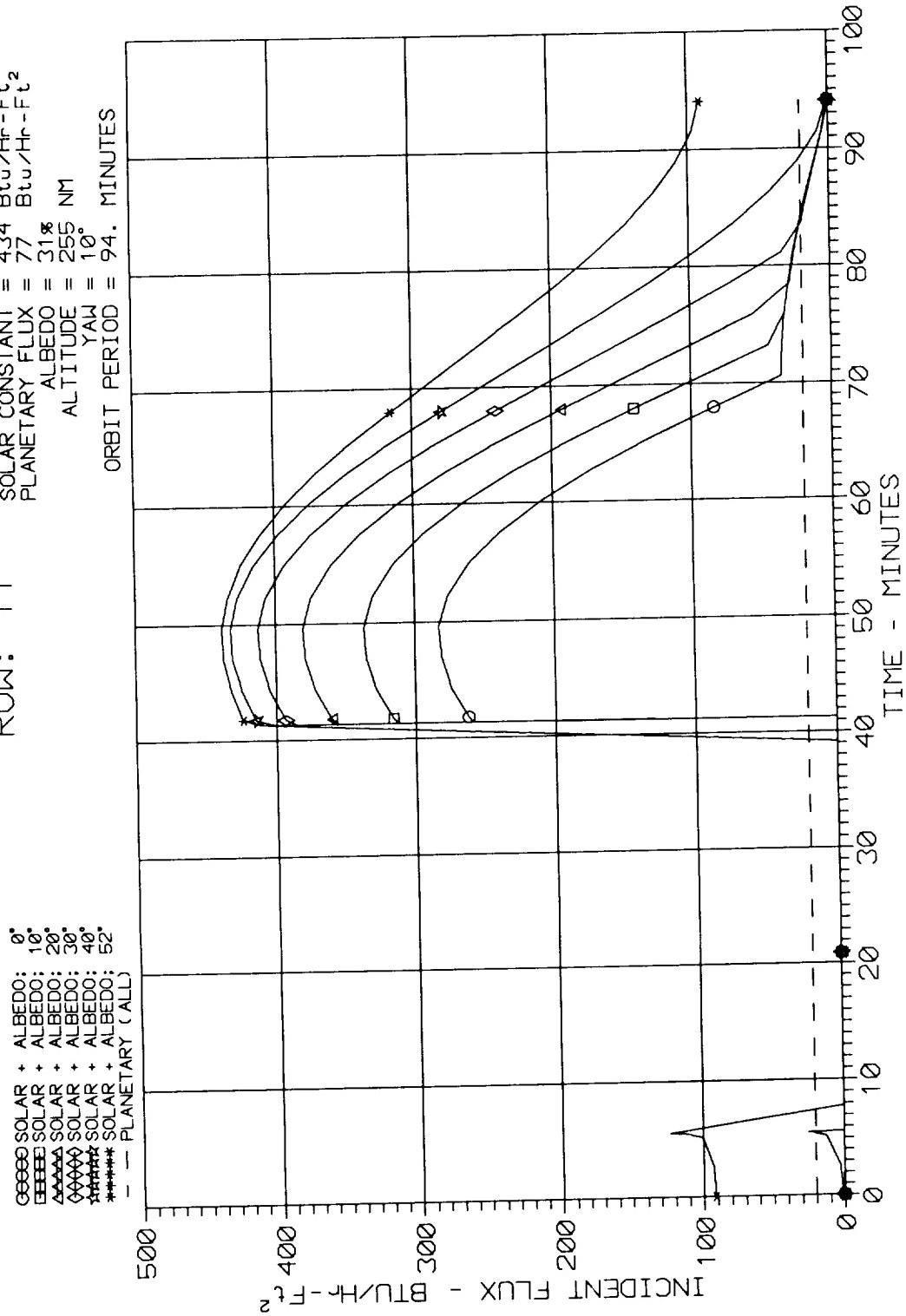
ALTITUDE = 255 NM

YAW = 10°

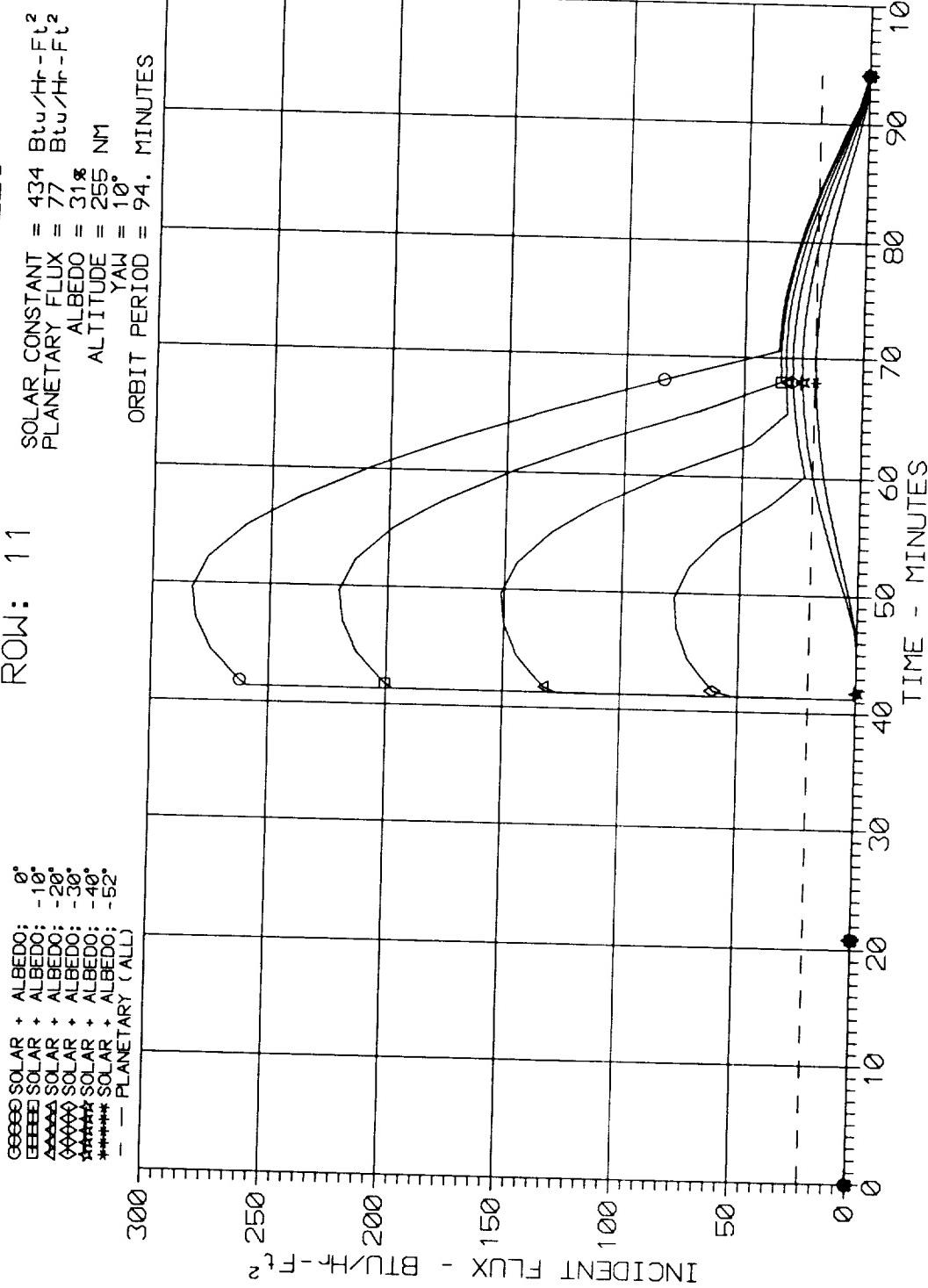
ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
ROW: 11



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
ROW: 11



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES

ROW: 12

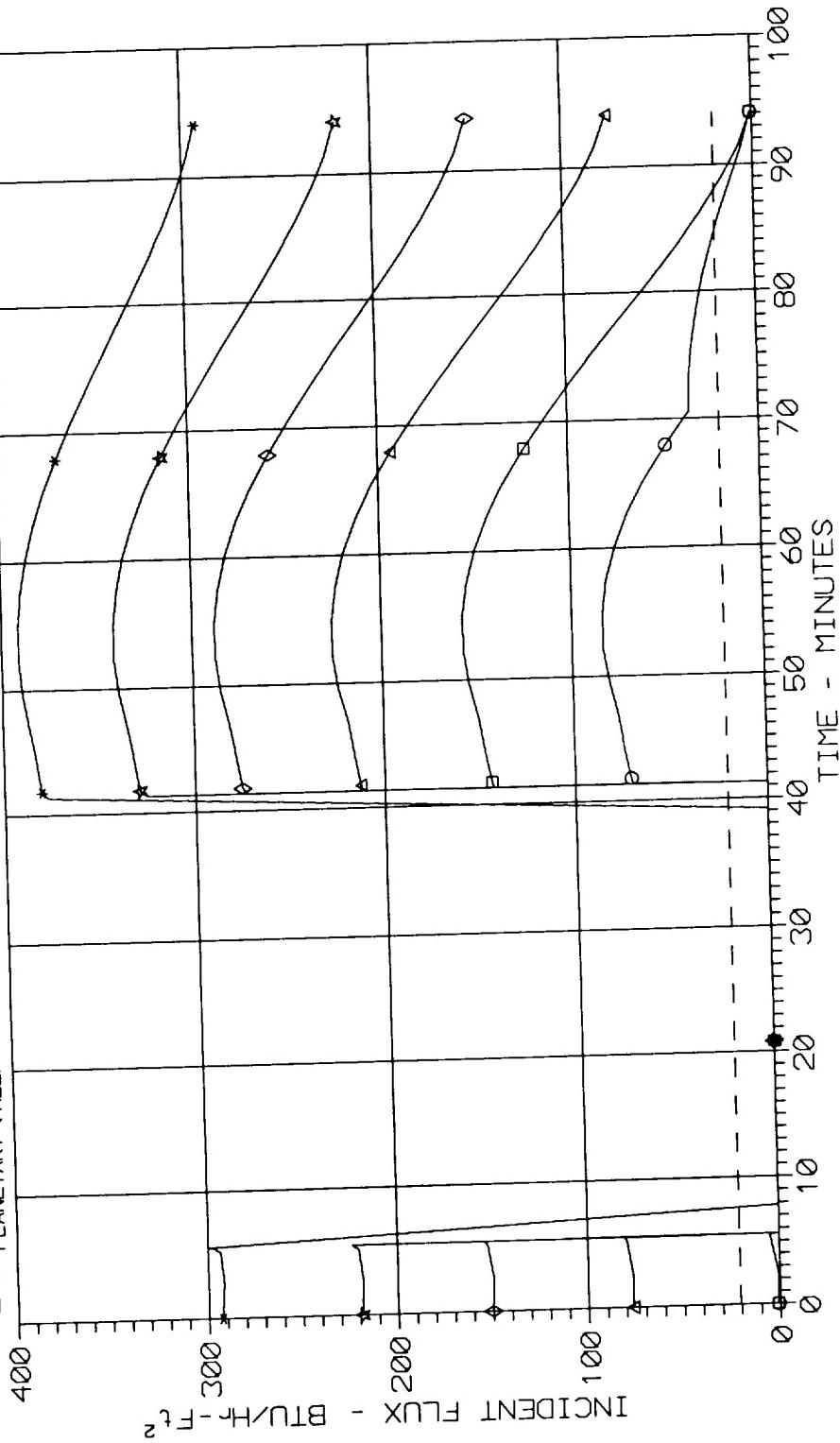
0° SOLAR + ALBEDO: 0°
10° SOLAR + ALBEDO: 10°
20° SOLAR + ALBEDO: 20°
30° SOLAR + ALBEDO: 30°
40° SOLAR + ALBEDO: 40°
52° SOLAR + ALBEDO: 52°
— PLANETARY (ALL)

SOLAR CONSTANT = 434 Btu/Hr - Ft²
PLANETARY FLUX = 77 Btu/Hr - Ft²
ALBEDO = 31% NM

ALTITUDE = 255 NM

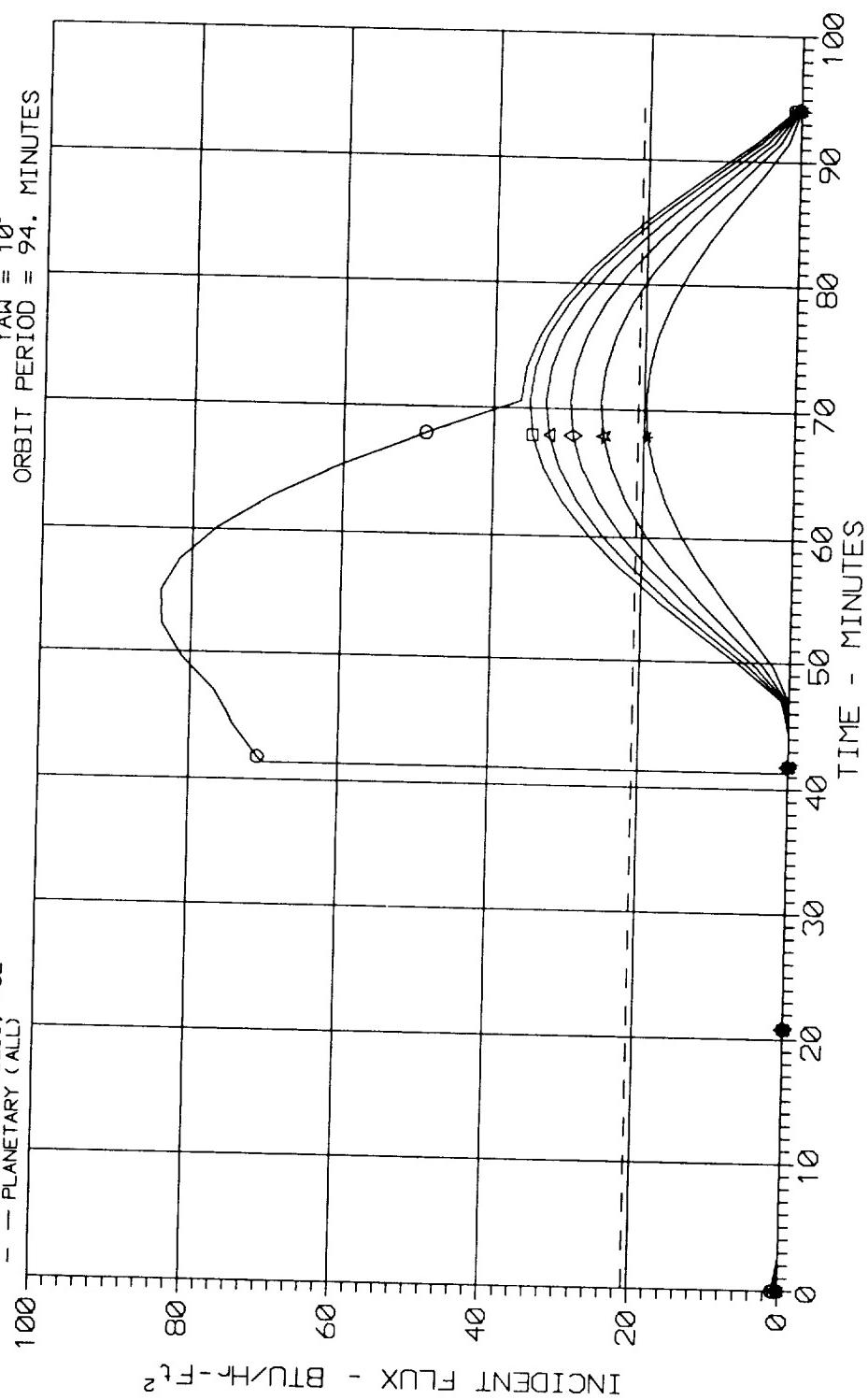
YAW = 10°

ORBIT PERIOD = 94. MINUTES



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
ROW: 12

SOLAR ALBEDO: 0°
 SOLAR ALBEDO: -10°
 SOLAR ALBEDO: -20°
 SOLAR ALBEDO: -30°
 SOLAR ALBEDO: -40°
 SOLAR ALBEDO: -50°
 PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
EARTH END

SOLAR CONSTANT = 434 Btu/Hr - Ft²
PLANETARY FLUX = 77 Btu/Hr - Ft²

ALBEDO = 31% NM

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

SOLAR + ALBEDO: 0°

SOLAR + ALBEDO: 10°

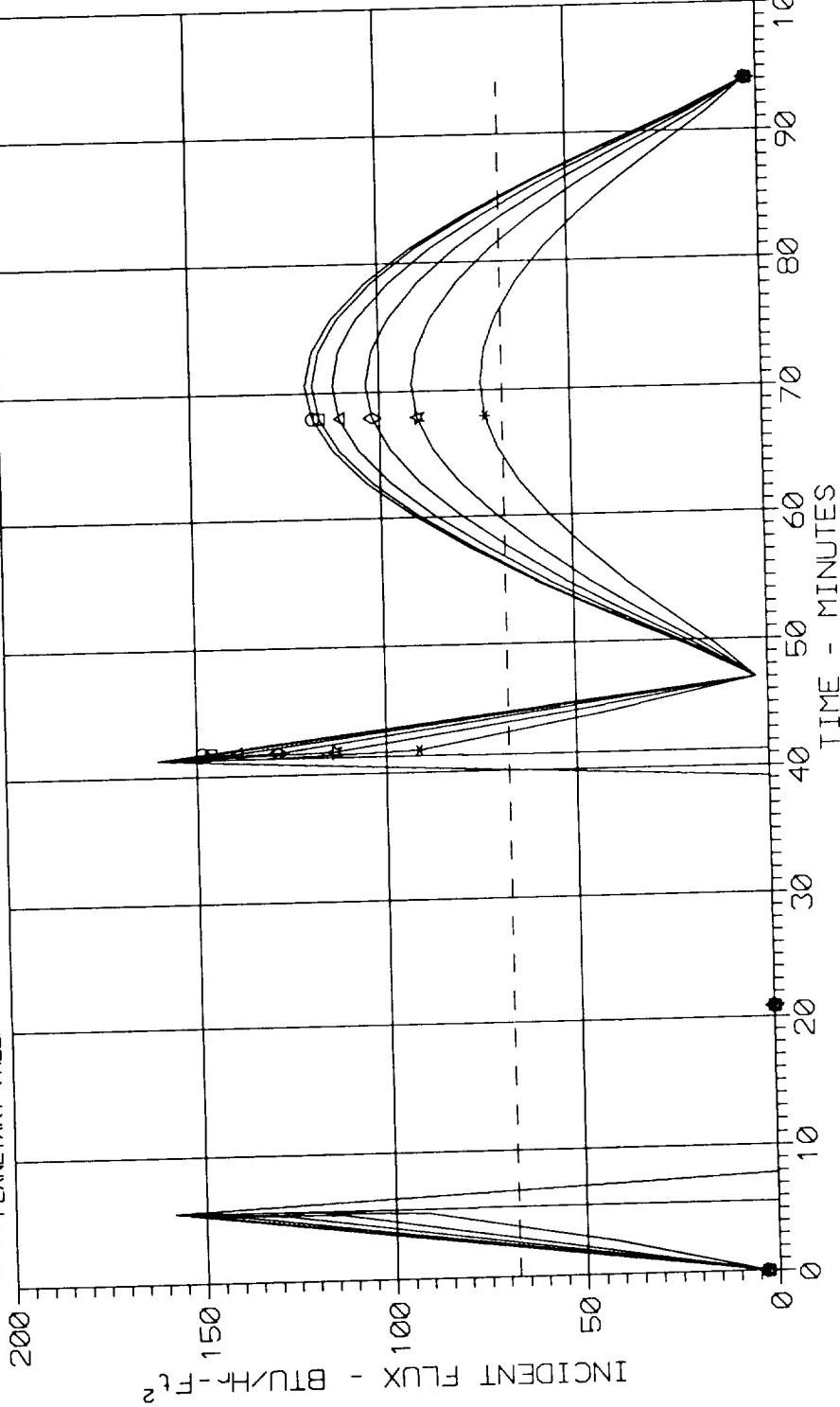
SOLAR + ALBEDO: 20°

SOLAR + ALBEDO: 30°

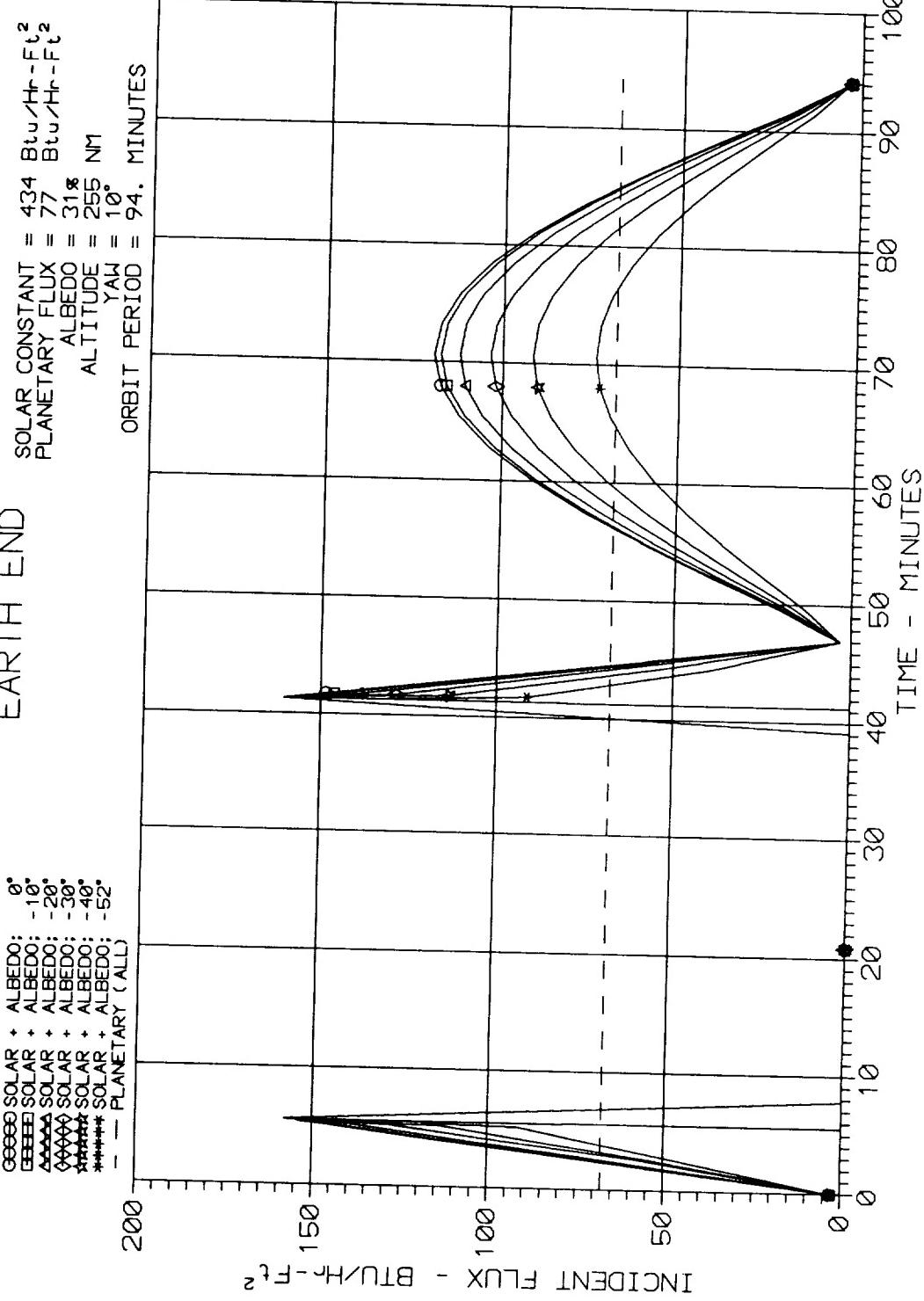
SOLAR + ALBEDO: 40°

SOLAR + ALBEDO: 52°

— PLANETARY (ALL)



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
EARTH END



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR POSITIVE BETA ANGLES
SPACE END

SOLAR CONSTANT = 434 Btu/Hr-Ft^2
PLANETARY FLUX = 77 Btu/Hr-Ft^2

ALBEDO = .318 NM

ALTITUDE = 255 NM

YAW = 10°

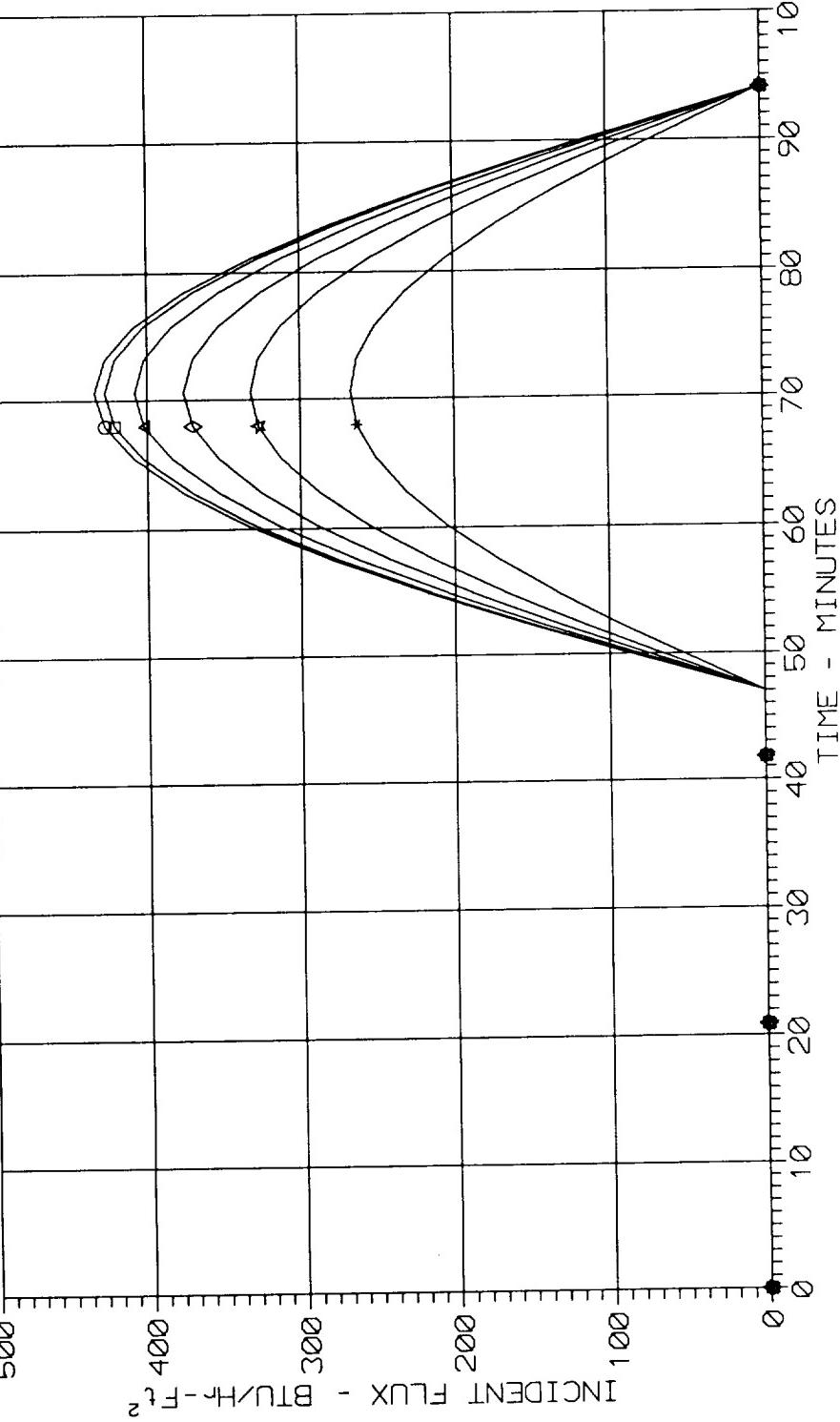
ORBIT PERIOD = 94. MINUTES

0° SOLAR;
10° SOLAR;
20° SOLAR;
30° SOLAR;
40° SOLAR;
52° SOLAR;

500

400
300
200
100

INCIDENT FLUX - BTU/Hr-Ft²



LONG DURATION EXPOSURE FACILITY
ORBITAL HEAT FLUX FOR NEGATIVE BETA ANGLES
SPACE END

SOLAR CONSTANT = 434 Btu/Hr- Ft^2
PLANETARY FLUX = 77 Btu/Hr- Ft^2

ALBEDO = .315

ALTITUDE = 255 NM

YAW = 10°

ORBIT PERIOD = 94. MINUTES

SOLAR: 0°

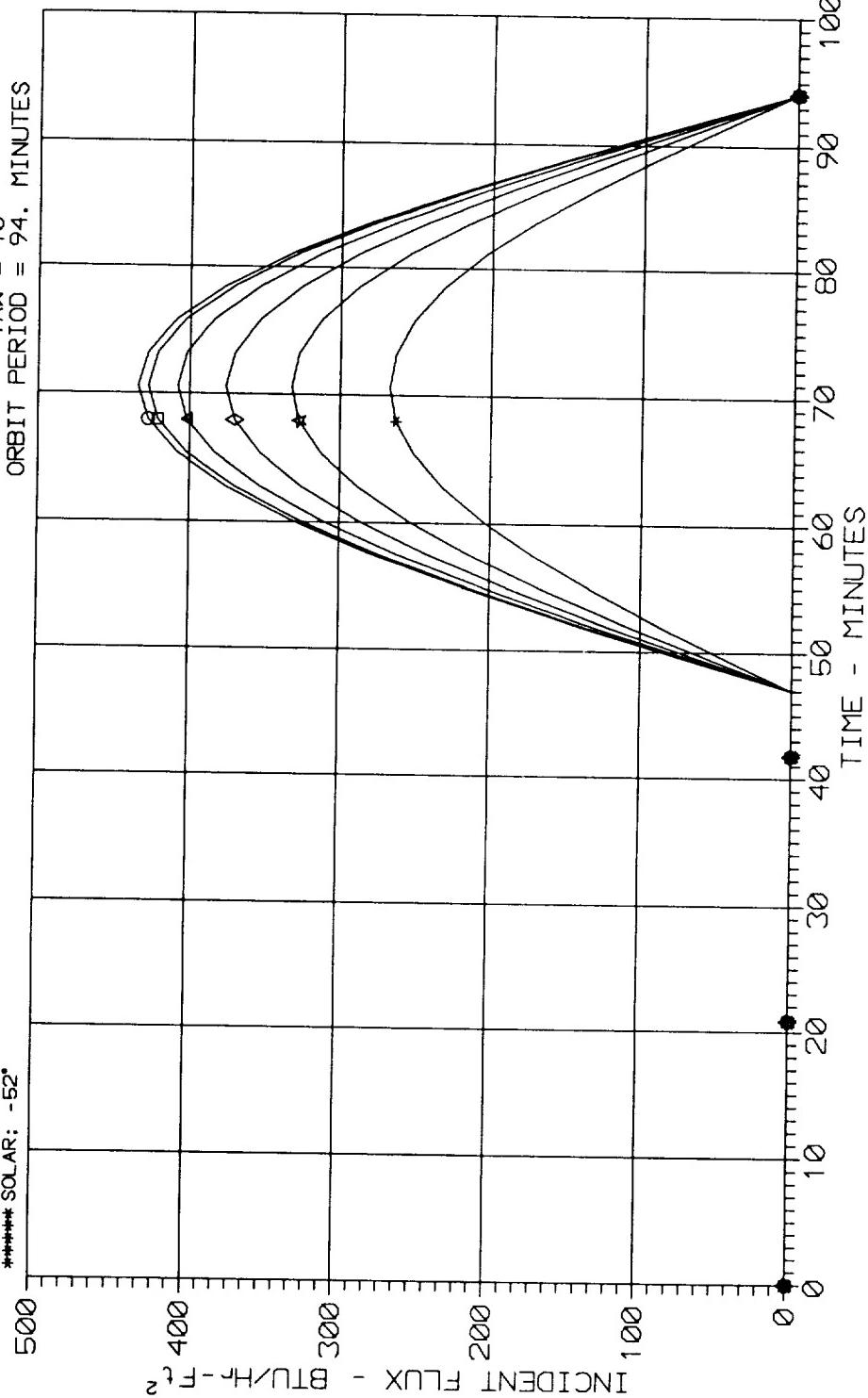
SOLAR: -10°

SOLAR: -20°

SOLAR: -30°

SOLAR: -40°

SOLAR: -52°



INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)													
ROW 1	TIME (Min)	BETA			BETA			BETA			BETA		
		-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg	52 Deg	
0.00	0.32	0.61	0.83	1.04	76.77	150.20	219.08	281.33	335.18	378.85	415.98		
2.61	0.01	0.02	0.03	0.05	73.21	146.26	214.89	277.02	330.76	374.52	412.06		
5.21	0.00	0.00	0.00	0.00	66.55	139.48	208.18	270.56	324.71	369.02	407.34		
5.54	0.00	0.00	0.00	0.00	65.10	138.34	206.74	268.17	320.64	362.27	400.52		
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	395.03		
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
44.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
47.04	0.01	0.08	0.14	0.19	0.40	0.62	0.82	1.04	1.26	1.48	1.70		
49.66	1.41	2.37	3.21	4.01	4.71	5.31	5.77	8.17	8.46	8.75	9.04		
52.28	4.66	6.77	8.35	9.69	10.74	11.46	11.83	20.26	20.62	21.00	21.38		
54.90	8.18	11.25	13.43	15.21	16.52	17.34	17.62	36.06	36.98	37.88	38.77		
57.52	11.48	15.35	18.07	20.24	21.79	22.69	22.89	55.03	56.67	58.31	59.94		
60.14	14.35	18.92	22.10	24.62	26.38	27.35	27.48	76.61	78.55	80.46	82.38		
62.76	16.71	21.85	25.42	28.22	30.16	31.18	31.25	100.12	102.22	104.31	106.31		
65.38	18.48	24.06	27.92	30.93	33.00	34.06	34.92	124.87	128.87	132.87	136.87		
67.99	19.62	25.48	29.52	32.66	34.82	35.91	36.91	81.35	85.09	88.75	92.41		
70.61	20.08	26.06	30.17	33.37	35.56	36.67	37.74	107.48	115.02	123.25	130.31		
73.22	19.86	25.78	29.86	33.04	35.21	62.09	132.51	198.91	259.26	311.74	362.03		
75.83	18.96	24.66	28.60	31.67	33.77	85.62	155.68	221.02	279.64	329.76	376.52		
78.44	17.41	22.73	26.42	29.30	33.31	106.55	176.30	240.69	297.77	345.80	389.41		
81.05	15.26	20.05	23.39	26.01	30.99	124.24	193.72	257.31	313.09	359.35	400.31		
83.66	12.56	16.70	19.59	21.89	64.69	138.16	207.43	270.39	325.14	370.01	408.89		
86.26	9.41	12.78	15.16	17.08	74.27	147.88	217.00	279.53	333.56	377.46	414.88		
88.87	5.95	8.41	10.22	11.72	79.41	153.11	222.15	284.44	338.09	381.46	418.11		
91.47	2.53	3.89	5.01	6.01	79.99	153.69	222.72	284.98	338.59	381.91	418.48		
94.07	0.32	0.61	0.83	1.04	76.77	150.20	219.08	281.33	335.18	378.85	415.98		
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)													
	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62		

ROW 1; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)												
ROW 2 TIME (Min)	BETA -52 Deg			BETA -40 Deg			BETA -30 Deg			BETA -20 Deg		
	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA
0.00	0.99	76.79	150.18	219.01	281.36	335.19	378.83	410.98	430.71	437.36	437.36	427.82
2.61	0.13	71.62	144.20	212.40	274.15	327.57	371.07	403.33	423.35	430.58	430.58	422.10
5.21	0.02	58.77	131.07	198.16	259.22	312.41	356.11	388.99	410.05	418.67	418.67	412.27
5.54	0.00	41.58	120.61	192.80	255.98	309.85	352.87	383.63	400.93	403.58	403.58	397.09
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	384.81
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.11
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.57
44.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.51
47.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.43
49.66	1.33	1.97	2.54	3.09	3.57	3.98	4.29	4.47	4.53	4.45	4.45	22.44
52.28	4.59	6.35	7.64	8.72	9.54	10.07	10.30	10.21	9.81	9.12	9.12	35.40
54.90	8.15	10.88	12.79	14.32	15.41	16.03	16.16	15.80	14.97	13.67	13.67	54.12
57.52	11.52	15.07	17.53	19.45	20.79	21.49	21.55	20.94	19.70	17.86	17.86	77.94
60.14	14.48	18.76	21.70	23.98	25.53	26.31	26.29	25.46	23.87	23.87	23.87	106.12
62.76	16.96	21.83	25.17	27.75	29.48	30.32	30.24	29.24	27.35	27.35	27.35	137.82
65.38	18.86	24.20	27.85	30.66	32.53	33.42	33.28	32.14	31.03	31.03	31.03	172.05
67.99	20.14	25.79	29.65	32.61	34.58	35.49	35.33	35.26	32.13	32.13	32.13	163.68
70.61	20.75	26.56	30.52	33.55	35.56	36.49	36.49	36.49	36.49	36.49	36.49	207.79
73.22	20.69	26.47	30.42	33.45	43.51	94.11	141.50	184.59	222.08	252.81	252.81	243.95
75.83	19.94	25.54	29.37	43.50	97.79	148.88	195.43	236.05	269.50	294.76	294.76	279.43
78.44	18.53	23.79	31.87	90.95	147.27	199.12	244.91	283.26	313.01	333.25	333.25	313.15
81.05	16.51	21.28	70.14	132.47	190.79	243.30	288.43	324.79	351.28	367.10	367.10	344.08
83.66	13.94	33.85	102.00	167.05	227.03	280.10	324.67	359.36	383.15	395.28	395.28	371.29
86.26	10.89	55.52	126.50	193.63	254.88	308.39	352.52	385.94	407.64	416.95	416.95	411.38
88.87	7.47	70.02	142.88	211.41	273.51	327.30	371.15	403.72	424.02	431.44	431.44	423.04
91.47	3.91	76.94	150.68	219.85	282.34	336.27	379.98	412.15	431.79	438.31	438.31	428.57
94.07	0.99	76.79	150.18	219.01	281.36	335.19	378.83	410.98	430.71	437.36	437.36	427.82

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

ROW 2; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)											
ROW 3	TIME (Min)	BETA	BETA	BETA	BETA	BETA	BETA	BETA	BETA		
		-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg		
0.00	20570	281.37	335.17	378.79	410.99	430.72	437.36	430.72	411.03	378.84	323.15
2.61	20010	274.28	327.09	369.99	401.65	421.12	427.83	421.57	402.51	371.27	319.06
5.21	187.93	259.24	310.14	351.63	382.44	401.63	408.62	403.19	385.51	356.14	306.73
5.54	168.50	239.86	298.42	344.75	378.27	398.33	404.45	396.30	373.79	336.74	287.27
5.59	152.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	271.47
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
44.42	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47.04	0.11	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49.66	1.93	2.33	2.63	2.90	3.10	3.23	3.29	3.27	3.15	2.97	2.66
52.28	5.32	6.75	7.73	8.50	9.02	9.26	9.22	8.90	8.31	7.49	6.18
54.90	8.91	11.28	12.89	14.10	14.89	15.22	15.09	14.50	13.47	12.03	9.79
57.52	12.30	15.50	17.65	19.27	20.30	20.72	20.50	19.67	18.23	16.24	13.17
60.14	15.29	19.22	21.86	23.84	25.09	25.58	25.30	24.24	22.45	19.97	16.16
62.76	17.81	22.36	25.41	27.68	29.12	29.67	29.32	28.08	25.99	23.11	18.67
65.38	19.77	24.80	28.17	30.68	32.26	32.86	32.46	31.08	28.75	25.55	20.63
67.99	21.12	26.48	30.06	32.74	34.42	35.05	34.62	33.14	30.65	27.23	23.67
70.61	21.81	27.34	31.04	33.80	35.53	36.18	47.34	57.07	68.29	76.10	82.05
73.22	21.83	35.77	57.65	77.79	95.55	110.42	121.33	129.74	132.79	133.01	127.77
75.83	51.78	90.07	119.05	144.40	165.37	181.31	191.74	196.35	194.73	187.65	171.41
78.44	92.03	140.16	175.67	205.84	229.75	246.69	256.13	257.79	251.61	237.79	211.67
81.05	127.67	184.50	225.80	260.23	286.76	304.57	313.13	312.18	301.74	282.13	247.32
83.66	157.61	221.75	267.91	305.93	334.65	353.20	361.03	357.88	343.86	319.39	277.26
86.26	180.94	250.78	300.73	341.54	371.97	391.10	398.35	393.49	376.68	348.42	300.61
88.87	196.96	270.71	323.26	365.99	397.59	417.12	423.97	417.94	399.21	368.35	316.63
91.47	205.20	280.93	334.81	378.52	410.73	430.46	437.11	430.47	410.76	378.57	324.87
94.07	205.70	281.37	335.17	378.79	410.99	430.72	437.36	430.72	411.03	378.84	325.15

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

ROW 3; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)												
ROW 4	TIME (Min)	BETA			BETA			BETA			BETA	
		-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg	52 Deg
0.00	370.91	410.99	430.72	437.36	430.73	411.00	378.79	335.09	281.33	219.03	135.67	
2.61	364.83	403.50	422.36	428.45	421.53	401.83	369.96	326.85	273.81	212.48	130.55	
5.21	353.00	389.02	406.11	410.89	403.19	383.23	351.63	309.35	257.67	198.18	119.01	
5.54	334.41	370.51	394.92	404.32	399.21	380.09	347.66	302.78	246.49	179.68	100.48	
5.59	319.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	85.40	
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
44.42	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
47.04	0.51	0.35	0.20	0.05	0.02	0.01	0.01	0.01	0.00	0.00	0.00	
49.66	3.02	3.28	3.40	3.44	3.38	3.22	3.00	2.71	2.36	2.00	1.54	
52.28	6.55	7.74	8.47	8.96	9.18	9.11	8.78	8.17	7.32	6.27	4.76	
54.90	10.10	12.18	13.50	14.42	14.90	14.93	14.50	13.64	12.35	10.70	8.25	
57.52	13.40	16.28	18.15	19.46	20.18	20.29	19.78	18.67	17.00	14.80	11.54	
60.14	16.32	19.92	22.26	23.92	24.86	25.04	24.46	23.13	21.11	18.44	14.45	
62.76	18.77	22.97	25.71	27.66	28.78	29.02	28.38	26.88	24.56	21.49	16.90	
65.38	51.78	25.35	28.39	30.58	31.83	32.12	31.43	29.79	27.24	23.87	18.81	
67.99	95.36	68.14	43.12	32.58	33.93	34.25	33.53	31.79	29.09	25.50	20.11	
70.61	139.63	123.22	105.39	84.37	60.77	35.33	34.60	32.81	30.03	26.33	20.78	
73.22	183.24	177.48	166.74	150.92	130.53	106.17	78.58	48.60	30.04	26.34	20.79	
75.83	224.86	229.27	225.28	214.45	197.11	173.77	145.15	112.13	75.70	36.96	20.14	
78.44	263.23	277.01	279.26	273.02	258.48	236.09	206.53	170.69	129.67	84.71	27.42	
81.05	297.19	319.26	327.02	324.84	312.80	291.25	260.85	222.52	177.43	126.95	61.38	
83.66	325.69	354.73	367.12	368.35	358.40	337.55	306.44	266.03	217.53	162.42	89.90	
86.26	347.88	382.34	398.34	402.22	393.89	373.59	341.94	299.90	248.75	190.04	112.10	
88.87	363.09	401.26	419.72	425.43	418.21	398.29	366.26	323.11	270.13	208.95	127.32	
91.47	370.84	410.90	430.63	437.26	430.61	410.88	378.66	334.94	281.04	218.60	135.12	
94.07	370.91	410.99	430.72	437.36	430.73	411.00	378.79	335.09	281.33	219.03	135.67	
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)												
	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	

ROW 4; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)											
ROW 5 TIME (Min)	BETA -52 Deg	BETA -40 Deg	BETA -30 Deg	BETA -20 Deg	BETA -10 Deg	BETA 0 Deg	BETA 10 Deg	BETA 20 Deg	BETA 30 Deg	BETA 40 Deg	BETA 52 Deg
0.00	437.10	430.72	410.99	378.77	335.15	281.36	219.03	150.08	76.74	1.09	0.69
2.61	431.83	424.60	404.46	372.10	328.46	274.87	212.95	144.56	71.79	0.08	0.07
5.21	423.48	414.55	393.26	360.05	315.90	262.15	200.43	132.63	60.79	0.01	0.01
5.54	410.73	401.88	385.60	355.55	313.17	259.99	197.71	128.13	53.15	0.00	0.00
5.59	400.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	124.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	113.24	26.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.80	100.62	12.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44.42	93.08	3.33	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47.04	91.62	1.09	0.79	0.49	0.35	0.23	0.11	0.00	0.00	0.00	0.00
49.66	97.46	8.11	4.92	4.83	4.59	4.21	3.74	3.18	2.55	1.91	1.18
52.28	108.91	21.83	10.12	10.46	10.49	10.20	9.59	8.70	7.55	6.19	4.32
54.90	125.13	42.55	15.15	15.92	16.21	16.00	15.31	14.16	12.57	10.60	7.78
57.52	145.58	67.99	19.76	20.92	21.45	21.33	20.56	19.16	17.18	14.68	11.05
60.14	169.62	97.91	34.74	25.31	26.05	26.00	25.16	23.55	21.23	18.26	13.92
62.76	196.54	131.40	72.60	28.96	29.88	29.88	28.98	27.20	24.59	21.24	16.30
65.38	225.50	167.44	113.35	55.81	32.81	32.86	31.91	30.00	27.17	23.52	18.13
67.99	255.64	204.94	155.74	101.80	44.78	34.84	33.86	31.85	28.88	25.03	19.35
70.61	286.03	242.75	198.48	148.19	93.39	35.76	34.76	32.72	29.68	25.73	19.91
73.22	315.75	279.73	240.29	193.55	140.93	84.03	34.60	32.56	29.53	25.61	19.81
75.83	343.90	314.76	279.89	236.52	185.96	129.75	69.60	31.39	28.45	24.65	19.05
78.44	369.62	346.76	316.07	275.78	227.10	171.53	110.75	46.60	26.46	22.89	17.64
81.05	392.13	374.77	347.74	310.14	263.12	208.10	146.76	80.96	23.64	20.39	15.64
83.66	410.75	397.94	373.93	338.56	292.90	238.34	176.54	109.38	38.89	17.22	13.09
86.26	424.92	415.56	393.85	360.17	315.55	261.34	199.20	130.99	58.81	13.47	10.09
88.87	434.19	427.10	406.90	374.33	330.39	276.41	214.03	145.15	71.86	9.27	6.76
91.47	438.29	432.20	412.67	380.59	336.95	283.07	220.59	151.42	77.67	4.81	3.33
94.07	437.10	430.72	410.99	378.77	335.15	281.36	219.03	150.08	76.74	1.09	0.69

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

20.62	20.62	20.62	20.62	20.62	20.62	20.62
20.62	20.62	20.62	20.62	20.62	20.62	20.62

ROW 5; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)

ROW 6	TIME (Min)	BETA -52 Deg	BETA -40 Deg	BETA -30 Deg	BETA -20 Deg	BETA 0 Deg	BETA 10 Deg	BETA 20 Deg	BETA 30 Deg	BETA 40 Deg	BETA 50 Deg	BETA 52 Deg
0.00	386.20	335.19	281.37	219.01	150.17	76.80	1.09	0.76	0.59	0.41	0.19	
2.61	383.13	331.93	278.20	216.07	147.39	74.27	0.05	0.03	0.02	0.01	0.01	0.01
5.21	380.49	329.00	275.04	212.73	143.96	70.82	0.00	0.00	0.00	0.00	0.00	0.00
5.54	376.98	325.57	272.97	211.51	143.23	70.24	0.00	0.00	0.00	0.00	0.00	0.00
5.59	374.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	299.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	296.62	224.12	154.64	81.03	5.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.80	293.27	220.50	152.37	79.63	4.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44.42	291.60	218.11	149.57	76.52	1.16	0.02	0.01	0.01	0.01	0.00	0.00	0.00
47.04	292.84	219.10	150.18	76.71	1.09	0.85	0.58	0.33	0.24	0.15	0.03	
49.66	297.26	224.42	156.09	83.01	7.41	5.81	5.17	4.41	3.54	2.62	1.55	
52.28	303.14	231.74	164.34	91.96	16.78	11.91	11.16	10.06	8.66	7.02	4.78	
54.90	310.13	240.43	174.17	102.63	27.96	17.71	16.87	15.51	13.68	11.44	8.25	
57.52	318.01	250.23	185.26	114.65	40.56	22.97	22.05	20.45	18.24	15.47	11.48	
60.14	326.54	260.84	197.25	127.67	54.20	27.53	26.54	24.74	22.19	18.96	14.28	
62.76	335.46	271.94	209.80	141.28	68.47	31.26	30.21	28.24	25.41	21.82	16.57	
65.38	344.50	283.19	222.51	155.08	82.93	34.04	32.94	30.85	27.82	23.94	18.27	
67.99	353.38	294.24	235.01	168.64	96.37	35.78	34.66	32.49	29.33	25.28	19.34	
70.61	361.84	304.77	246.91	181.55	110.67	36.43	35.30	33.10	29.89	25.78	19.75	
73.22	369.62	314.45	257.85	193.42	123.11	49.07	34.86	32.68	29.50	25.43	19.47	
75.83	376.48	322.98	267.50	203.89	134.09	60.21	33.34	31.23	28.16	24.25	18.52	
78.44	382.21	330.12	275.57	212.65	143.26	69.52	30.78	28.79	25.92	22.26	16.93	
81.05	386.65	335.64	281.81	219.41	150.35	76.73	27.28	25.45	22.84	19.54	14.75	
83.66	389.65	339.37	286.02	223.99	155.15	81.60	22.93	21.29	19.01	16.15	12.03	
86.26	391.12	341.20	288.10	226.24	157.51	83.99	17.86	16.46	14.56	12.21	8.88	
88.87	391.02	341.08	287.96	226.09	157.35	83.83	12.24	11.09	9.61	7.85	5.44	
91.47	389.35	339.00	285.62	223.55	154.70	81.14	6.26	5.43	4.46	3.40	2.12	
94.07	386.20	335.19	281.37	219.01	150.17	76.80	1.09	0.76	0.59	0.41	0.19	

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

ROW 6; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)													
ROW 7	TIME (Min)	BETA -52 Deg			BETA -40 Deg			BETA -30 Deg			BETA 0 Deg		
		BETA -52 Deg	BETA -40 Deg	BETA -30 Deg	BETA -20 Deg	BETA -10 Deg	BETA 0 Deg	BETA -10 Deg	BETA -20 Deg	BETA -30 Deg	BETA 0 Deg	BETA -10 Deg	BETA -20 Deg
0.00	232.09	150.20	76.78	1.04	0.82	0.62	0.40	0.19	0.14	0.08	0.01	0.00	0.00
2.61	231.77	150.34	77.41	2.17	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.21	235.55	155.30	83.12	8.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.54	242.23	162.02	87.19	10.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.59	247.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	394.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	400.51	361.83	320.25	267.81	206.39	137.94	64.76	0.00	0.00	0.00	0.00	0.00	0.00
41.80	407.34	369.02	324.71	270.56	208.18	139.48	66.55	0.00	0.00	0.00	0.00	0.00	0.00
44.42	412.05	374.52	330.76	277.02	214.89	146.26	73.21	0.05	0.03	0.02	0.01	0.00	0.00
47.04	415.97	378.85	335.18	281.33	219.08	150.20	76.77	1.04	0.83	0.61	0.32	0.00	0.00
49.66	418.48	381.90	338.59	284.98	222.72	153.69	79.99	6.01	5.01	3.89	2.51	0.00	0.00
52.28	418.12	381.46	338.09	284.44	222.15	153.11	79.41	11.72	10.22	8.41	5.92	0.00	0.00
54.90	414.91	377.46	333.56	279.53	217.00	147.88	74.27	17.08	15.16	12.78	9.37	0.00	0.00
57.52	408.92	370.01	325.14	270.39	207.43	138.16	64.69	21.89	19.59	16.70	12.51	0.00	0.00
60.14	400.35	359.35	313.09	257.31	193.72	124.24	50.99	26.01	23.39	20.05	15.20	0.00	0.00
62.76	389.46	345.80	297.77	240.69	176.30	106.55	33.37	29.30	26.42	22.73	17.35	0.00	0.00
65.38	376.57	329.76	279.64	221.02	155.68	85.62	33.77	31.67	28.60	24.66	18.90	0.00	0.00
67.99	362.09	311.74	259.26	198.91	132.51	62.09	35.21	33.04	29.86	25.78	19.79	0.00	0.00
70.61	346.44	292.27	237.25	175.02	107.48	36.67	35.56	33.37	30.17	26.06	20.01	0.00	0.00
73.22	330.10	271.94	214.27	150.09	81.35	35.91	34.82	32.66	29.52	25.48	19.54	0.00	0.00
75.83	313.58	251.38	191.03	124.87	54.92	34.06	33.00	30.93	27.92	24.06	18.41	0.00	0.00
78.44	297.36	231.21	168.22	100.12	31.25	31.18	30.16	28.62	25.42	21.85	16.64	0.00	0.00
81.05	281.96	212.04	146.55	76.61	27.48	27.35	26.38	24.62	22.10	18.92	14.29	0.00	0.00
83.66	267.82	194.45	126.67	54.13	22.89	22.69	21.79	20.24	18.07	15.35	11.43	0.00	0.00
86.26	255.39	178.98	109.18	36.06	17.62	17.34	16.52	15.21	13.43	11.25	8.14	0.00	0.00
88.87	245.04	166.10	94.62	20.26	11.83	11.46	10.74	9.69	8.35	6.77	4.63	0.00	0.00
91.47	237.10	156.22	83.46	8.17	5.77	5.31	4.71	4.01	3.21	2.37	1.40	0.00	0.00
94.07	232.09	150.20	76.78	1.04	0.82	0.62	0.40	0.19	0.14	0.08	0.01	0.00	0.00
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)													
	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62		

ROW 7; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)													
ROW 8	TIME (Min)	BETA			BETA			BETA			BETA		
		-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg	50 Deg	52 Deg
0.00	16.27	0.86	0.61	0.35	0.24	0.16	0.08	0.00	0.00	0.00	0.00	0.00	0.00
2.61	18.43	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.21	27.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.54	42.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.59	54.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	383.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	397.09	402.59	400.05	382.82	352.10	308.95	255.21	192.00	121.23	43.95	0.00	0.00	0.00
41.80	412.27	418.67	410.05	388.99	356.11	312.41	259.22	198.16	131.08	60.01	0.02	0.00	0.00
44.42	422.10	430.58	423.35	403.33	371.07	327.57	274.15	212.40	144.20	71.62	0.14	0.00	0.00
47.04	427.81	437.36	430.72	410.99	378.84	335.20	281.37	219.03	150.20	76.81	1.01	0.00	0.00
49.66	428.60	438.35	431.83	412.19	380.03	336.32	282.40	219.90	150.73	76.99	3.95	0.00	0.00
52.28	423.10	431.50	424.09	403.80	371.23	327.39	273.60	211.49	142.96	70.09	7.51	0.00	0.00
54.90	411.47	417.04	407.74	386.06	352.64	308.51	255.00	193.75	126.61	55.62	10.94	0.00	0.00
57.52	394.08	395.39	383.27	359.50	324.81	280.25	227.18	167.20	102.14	33.98	13.99	0.00	0.00
60.14	371.44	367.22	351.43	324.95	288.60	243.48	190.96	132.64	70.29	21.42	16.58	0.00	0.00
62.76	344.24	333.39	313.17	283.44	245.10	199.31	147.46	91.14	32.04	23.95	18.60	0.00	0.00
65.38	313.32	294.91	269.68	236.25	195.64	149.08	98.00	43.94	29.55	25.71	20.01	0.00	0.00
67.99	279.61	252.97	222.26	184.79	141.71	94.33	44.08	33.65	30.61	26.65	20.76	0.00	0.00
70.61	244.14	208.83	172.36	130.65	84.97	36.71	35.77	33.75	30.71	26.73	20.82	0.00	0.00
73.22	207.97	163.83	121.49	75.45	35.54	35.70	34.78	32.81	29.84	25.96	20.21	0.00	0.00
75.83	172.22	119.35	71.20	32.33	33.48	33.61	32.73	30.85	28.03	24.36	18.92	0.00	0.00
78.44	137.97	76.73	27.50	29.40	30.41	30.50	29.66	27.92	25.33	21.98	17.01	0.00	0.00
81.05	106.26	37.27	24.00	25.61	26.44	26.46	25.69	24.13	21.84	18.88	14.53	0.00	0.00
83.66	78.05	17.95	19.81	21.06	21.67	21.62	20.92	19.58	17.64	15.17	11.56	0.00	0.00
86.26	54.20	13.74	15.04	15.89	16.25	16.12	15.50	14.41	12.88	10.96	8.18	0.00	0.00
88.87	35.45	9.16	9.86	10.26	10.35	10.13	9.60	8.78	7.70	6.40	4.60	0.00	0.00
91.47	22.46	4.46	4.54	4.49	4.31	4.00	3.59	3.12	2.56	2.00	1.34	0.00	0.00
94.07	16.27	0.86	0.61	0.35	0.24	0.16	0.08	0.00	0.00	0.00	0.00	0.00	0.00
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)													
	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62		

ROW 8; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)												
ROW 9 TIME (Min)	BETA -52 Deg			BETA -40 Deg			BETA -30 Deg			BETA -20 Deg		
	BETA	BETA	BETA									
0.00	0.37	0.24	0.13	0.02	0.00	0.00	0.00	0.00	0.01	0.04	0.08	0.11
2.61	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
5.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	269.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	287.27	335.47	372.66	395.26	403.46	403.46	397.18	377.29	343.71	297.48	238.59	168.50
41.80	306.73	356.14	385.51	403.19	408.62	401.63	382.44	351.63	310.14	259.24	187.93	
44.42	319.05	371.27	402.51	421.57	427.83	421.12	401.65	369.99	327.09	274.28	200.11	
47.04	325.14	378.84	411.03	430.72	437.36	430.72	410.99	378.79	335.17	281.37	205.70	
49.66	324.88	378.57	410.76	430.48	437.11	430.46	410.73	378.52	334.82	280.93	205.19	
52.28	316.65	368.35	399.21	417.94	423.97	417.12	397.60	365.99	323.26	270.72	196.94	
54.90	300.64	348.43	376.69	393.50	398.36	391.11	371.98	341.55	300.74	250.79	180.91	
57.52	277.31	319.40	343.87	357.89	361.04	353.22	334.66	305.94	267.92	221.76	157.57	
60.14	247.37	282.15	301.76	312.19	313.15	304.59	286.77	260.24	225.81	184.51	127.63	
62.76	211.74	237.81	251.63	257.80	256.15	246.71	229.77	205.67	175.50	140.17	91.99	
65.38	171.48	187.72	195.01	196.37	191.76	181.33	165.38	143.85	118.20	89.98	51.73	
67.99	127.84	133.42	133.62	129.75	121.95	108.87	94.99	71.19	57.67	35.78	21.77	
70.61	82.13	76.55	69.32	59.99	48.83	36.20	35.54	33.81	31.05	27.35	21.76	
73.22	35.75	27.24	30.66	33.16	34.64	35.07	34.44	32.76	30.08	26.49	21.06	
75.83	20.70	25.56	28.77	31.10	32.48	32.88	30.70	28.18	24.81	19.72		
78.44	18.74	23.12	26.01	28.10	29.34	29.69	29.14	27.70	25.42	22.37	17.76	
81.05	16.22	19.99	22.46	24.25	25.31	25.60	25.11	23.85	21.88	19.23	15.24	
83.66	13.22	16.26	18.24	19.68	20.52	20.73	20.31	19.28	17.66	15.50	12.25	
86.26	9.84	12.04	13.48	14.51	15.10	15.23	14.90	14.11	12.90	11.29	8.88	
88.87	6.22	7.50	8.32	8.91	9.23	9.27	9.02	8.51	7.74	6.75	5.29	
91.47	2.67	2.98	3.16	3.27	3.30	3.23	3.10	2.90	2.63	2.33	1.92	
94.07	0.37	0.24	0.13	0.02	0.00	0.00	0.00	0.00	0.01	0.04	0.11	

INCIDENT PLANETARY FLUX (BTU/HR-SqFt)

TIME

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)										
ROW 10 TIME (Min)	BETA			BETA			BETA			BETA 52 Deg
	-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg	30 Deg	
0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.20	0.35	0.52
2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
5.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	80.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	97.97	178.47	245.41	301.79	346.71	378.98	398.26	403.33	394.03	369.29
41.80	119.00	198.18	257.67	309.35	351.63	383.23	403.19	410.89	406.11	389.02
44.42	130.55	212.48	273.81	326.85	369.96	401.83	421.53	428.44	422.36	403.50
47.04	135.67	219.03	281.33	335.09	378.79	411.00	430.72	437.36	430.72	410.99
49.66	135.13	218.60	281.04	334.94	378.66	410.88	430.61	437.26	430.62	410.90
52.28	127.33	208.95	270.13	323.10	366.26	398.28	418.21	425.43	419.72	401.26
54.90	112.13	190.03	248.74	299.90	341.94	373.59	393.89	402.22	398.33	382.34
57.52	89.93	162.42	217.53	266.02	306.44	337.54	358.39	368.35	367.11	354.73
60.14	61.43	126.95	177.43	222.51	260.84	291.24	312.79	324.84	327.02	319.26
62.76	27.47	84.70	129.66	170.69	206.53	236.09	258.48	273.01	279.25	277.01
65.38	20.20	36.96	75.69	112.12	145.15	173.76	197.10	214.45	225.28	229.26
67.99	20.85	26.33	30.03	47.27	78.11	106.16	130.52	150.92	166.73	177.48
70.61	20.84	26.32	30.02	32.80	34.59	35.33	60.77	84.36	105.39	123.22
73.22	20.17	25.49	29.08	31.78	33.52	34.24	33.92	32.57	43.12	68.13
75.83	18.86	23.86	27.24	29.78	31.43	32.12	31.83	30.57	28.39	25.34
78.44	16.96	21.49	24.55	26.87	28.37	29.01	28.77	27.66	25.70	22.97
81.05	14.50	18.43	21.10	23.13	24.45	25.03	24.85	23.92	22.25	19.91
83.66	11.58	14.80	16.99	18.67	19.78	20.29	20.18	19.46	18.14	16.27
86.26	8.28	10.69	12.35	13.63	14.50	14.93	14.90	14.42	13.50	12.17
88.87	4.79	6.27	7.32	8.17	8.77	9.11	9.17	8.96	8.47	7.74
91.47	1.55	1.99	2.36	2.71	3.00	3.22	3.38	3.44	3.40	3.28
94.07	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.05	0.20	0.35
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)										ROW 10; INCIDENT THERMAL FLUX VS. TIME
20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	

ROW 11	INCIDENT SOLAR + ALBEDO (BTU/Hr-SqFt)										INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)					
	TIME (Min)	BETA -52 Deg	BETA -40 Deg	BETA -30 Deg	BETA -20 Deg	BETA -10 Deg	BETA 0 Deg	BETA 10 Deg	BETA 20 Deg	BETA 30 Deg	BETA 40 Deg	BETA 50 Deg	BETA 40 Deg	BETA 20.62	BETA 20.62	BETA 20.62
0.00	0.00	0.00	0.00	0.00	0.11	0.23	0.35	0.49	0.79	1.09	91.63	93.08	12.89	3.33	12.53	100.62
2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.53
5.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	113.24
5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	123.56
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	400.20
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	410.73
41.36	0.00	0.00	52.41	127.46	197.07	259.24	312.53	354.88	385.00	401.05	410.73	423.48	423.48	393.26	414.55	423.48
41.80	0.01	0.01	60.79	132.63	200.43	262.15	315.89	360.05	393.26	414.55	423.48	431.84	431.84	404.46	424.60	431.84
44.42	0.07	0.08	71.79	144.56	212.95	274.87	328.46	372.10	404.46	424.60	431.84	437.11	437.11	410.99	430.72	437.11
47.04	0.69	1.09	76.74	150.08	219.03	281.36	335.15	378.77	410.99	430.72	438.29	438.29	438.29	412.67	432.20	438.29
49.66	3.34	4.81	77.67	151.43	220.59	283.07	336.95	380.59	412.67	432.20	434.18	434.18	434.18	406.89	427.10	434.18
52.28	6.78	9.27	71.86	145.15	214.03	276.41	330.39	374.33	406.89	427.10	424.89	424.89	424.89	393.85	415.56	424.89
54.90	10.13	13.47	58.81	130.99	199.20	261.35	315.55	360.17	393.85	397.94	410.72	410.72	410.72	373.93	397.94	410.72
57.52	13.14	17.22	38.89	109.38	176.54	238.34	292.90	338.56	373.93	397.94	392.09	392.09	392.09	347.74	374.77	392.09
60.14	15.69	20.39	23.64	80.96	146.76	208.10	263.12	310.14	347.74	374.77	392.09	392.09	392.09	346.76	369.57	392.09
62.76	17.70	22.89	26.46	46.60	110.75	171.53	227.10	275.78	316.07	346.76	369.57	369.57	369.57	343.84	343.84	369.57
65.38	19.11	24.65	28.45	31.39	69.60	129.75	185.96	236.52	279.89	314.75	343.84	343.84	343.84	315.69	315.69	343.84
67.99	19.88	25.61	29.53	32.56	34.60	84.03	140.93	193.55	240.29	279.73	315.69	315.69	315.69	279.73	315.69	315.69
78.44	16.37	21.24	24.59	27.20	28.98	29.88	29.88	29.88	29.88	72.60	131.40	131.40	131.40	196.49	196.49	196.49
81.05	13.98	18.26	21.23	23.55	25.16	26.00	26.05	26.05	26.05	25.31	242.75	242.75	242.75	197.91	169.58	197.91
83.66	11.10	14.68	17.18	21.85	33.86	34.84	44.78	101.80	155.74	204.94	225.45	225.45	225.45	167.44	167.44	225.45
86.26	7.82	10.60	12.57	27.17	30.00	31.91	32.86	32.86	55.81	113.35	125.10	125.10	125.10	42.55	42.55	125.10
88.87	4.35	6.19	7.55	8.70	9.59	10.20	10.49	10.49	10.49	10.12	22.36	22.36	22.36	108.89	108.89	22.36
91.47	1.19	1.91	2.55	3.18	3.74	4.21	4.59	4.83	4.92	8.11	97.45	97.45	97.45	8.11	8.11	97.45
94.07	0.00	0.00	0.00	0.00	0.11	0.23	0.35	0.49	0.79	1.09	91.63	91.63	91.63	1.09	1.09	91.63

INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)											
ROW 12	TIME (Min)	BETA				BETA				BETA	
		-52 Deg	-40 Deg	-30 Deg	-20 Deg	-10 Deg	0 Deg	10 Deg	20 Deg	30 Deg	40 Deg
0.00	0.03	0.15	0.24	0.33	0.58	0.85	1.09	76.71	150.18	219.10	292.85
2.61	0.00	0.00	0.01	0.01	0.01	0.02	1.16	76.52	149.57	218.11	291.60
5.21	0.00	0.00	0.00	0.00	0.00	0.00	4.48	79.63	152.37	220.50	293.27
5.54	0.00	0.00	0.00	0.00	0.00	0.00	5.21	80.85	154.44	223.90	296.62
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	299.40
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.03	143.05	211.33	272.80
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.82	143.96	212.73	275.04
44.42	0.01	0.01	0.02	0.03	0.05	0.05	74.27	147.39	216.07	278.20	329.00
47.04	0.19	0.41	0.59	0.76	1.09	1.09	76.80	150.17	219.01	281.37	383.13
49.66	2.13	3.40	4.46	5.43	6.26	81.14	154.70	223.55	285.62	335.19	386.21
52.28	5.46	7.85	9.61	11.09	12.24	83.83	157.35	226.09	287.96	339.00	376.98
54.90	8.92	12.21	14.56	16.46	17.86	83.99	157.51	226.24	288.10	341.20	380.49
57.52	12.08	16.15	19.01	21.29	22.93	81.60	155.15	223.99	286.02	339.37	386.21
60.14	14.80	19.54	22.84	25.45	27.28	76.73	150.35	219.41	281.81	335.64	386.61
62.76	16.99	22.26	25.92	28.79	30.78	69.52	143.26	212.65	275.57	330.12	382.17
65.38	18.59	24.25	28.16	31.22	33.34	60.21	134.09	203.89	267.50	322.98	376.43
67.99	19.54	25.43	29.50	32.68	34.86	49.07	123.11	193.42	257.85	314.45	369.56
70.61	19.82	25.78	29.89	33.10	35.30	36.43	110.67	181.55	246.91	304.77	361.78
73.22	19.42	25.28	29.33	32.49	34.66	35.78	97.14	168.64	235.01	294.24	353.32
75.83	18.34	23.94	27.82	30.85	32.94	34.04	82.93	155.08	222.51	283.19	344.44
78.44	16.63	21.82	25.41	28.24	30.21	31.26	68.47	141.28	209.80	271.94	335.41
81.05	14.34	18.96	22.19	24.74	26.54	27.53	54.20	127.67	197.25	260.84	326.49
83.66	11.53	15.47	18.24	20.45	22.05	22.97	40.56	114.65	185.26	250.23	317.98
86.26	8.29	11.44	13.68	15.51	16.87	17.71	27.96	102.63	174.17	240.43	310.11
88.87	4.81	7.02	8.66	10.06	11.16	11.91	16.78	91.96	164.34	231.74	303.13
91.47	1.56	2.62	3.54	4.41	5.17	5.81	7.41	83.01	156.09	224.42	297.26
94.07	0.03	0.15	0.24	0.33	0.58	0.85	1.09	76.71	150.18	219.10	292.85

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62	20.62
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

ROW 12; INCIDENT THERMAL FLUX VS. TIME

INCIDENT SOLAR + ALBEDO (BTU/Hr-SqFt)												
EARTH END TIME (Min)	-52 Deg			-40 Deg			-30 Deg			-20 Deg		
	BETA	BETA	BETA									
0.00	3.04	3.03	3.05	3.03	3.02	3.06	3.02	3.03	3.02	3.03	3.05	3.05
2.61	46.76	54.19	57.54	69.42	74.32	75.46	74.32	70.94	65.42	57.95	41.65	41.65
5.21	91.43	113.72	128.55	139.49	146.18	148.44	146.18	139.49	128.55	113.72	91.43	91.43
5.54	133.60	157.58	157.46	157.33	157.33	157.33	157.33	157.37	157.43	157.58	133.60	133.60
5.59	157.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	158.16
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	160.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	158.61
41.36	133.60	159.95	159.90	159.86	159.84	160.31	159.84	159.86	159.84	159.95	133.60	133.60
41.80	91.43	113.72	128.55	139.49	146.18	148.44	146.18	139.49	128.55	113.72	91.43	91.43
44.42	39.84	54.32	65.42	70.94	74.32	75.46	74.32	70.94	65.42	55.00	42.99	42.99
47.04	3.04	3.03	3.05	3.03	3.03	3.06	3.02	3.03	3.05	3.03	3.05	3.05
49.66	13.14	16.12	18.13	19.62	20.54	20.86	20.54	19.62	18.13	16.12	13.13	13.13
52.28	25.21	31.33	35.40	38.42	40.26	40.88	40.26	38.42	35.40	31.33	25.18	25.18
54.90	36.79	45.78	51.76	56.16	58.86	59.76	58.86	56.16	51.76	45.78	36.74	36.74
57.52	47.30	58.86	66.54	72.20	75.67	76.83	75.67	72.20	66.54	58.86	47.23	47.23
60.14	56.37	70.14	79.30	86.04	90.17	91.57	90.17	86.04	79.30	70.14	56.29	56.29
62.76	63.73	79.30	89.65	97.27	101.94	103.52	101.94	97.27	89.65	79.30	63.64	63.64
65.38	69.15	86.04	97.27	105.55	110.62	112.32	110.62	105.55	97.27	86.04	69.05	69.05
67.99	72.47	90.17	101.94	110.62	115.93	117.71	115.93	110.62	101.94	90.17	72.37	72.37
70.61	73.59	91.57	103.52	112.32	117.71	119.53	117.71	112.32	103.52	91.57	73.48	73.48
73.22	72.47	90.17	101.94	110.62	115.93	117.71	115.93	110.62	101.94	90.17	72.37	72.37
75.83	69.15	86.04	97.27	105.55	110.62	112.32	110.62	105.55	97.27	86.04	69.05	69.05
78.44	63.73	79.30	89.65	97.27	101.94	103.52	101.94	97.27	89.65	79.30	63.64	63.64
81.05	56.37	70.14	79.30	86.04	90.17	91.57	90.17	86.04	79.30	70.14	56.29	56.29
83.66	47.30	58.86	66.54	72.20	75.67	76.83	75.67	72.20	66.54	58.86	47.23	47.23
86.26	36.79	45.78	51.76	56.16	58.86	59.76	58.86	56.16	51.76	45.78	36.74	36.74
88.87	25.21	31.33	35.40	38.42	40.26	40.88	40.26	38.42	35.40	31.33	25.18	25.18
91.47	13.14	16.12	18.13	19.62	20.54	20.86	20.54	19.62	18.13	16.12	13.13	13.13
94.07	3.04	3.03	3.05	3.03	3.03	3.02	3.02	3.02	3.02	3.03	3.03	3.05
INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)												
	67.86	67.86	67.86	67.86	67.86	67.86	67.86	67.86	67.86	67.86	67.86	

SPACE END TIME (Min)	INCIDENT SOLAR + ALBEDO (BTU/HR-SqFt)										BETA 52 Deg
	-52 Deg	BETA -40 Deg	BETA -30 Deg	BETA -20 Deg	BETA -10 Deg	BETA 0 Deg	BETA 10 Deg	BETA 20 Deg	BETA 30 Deg	BETA 40 Deg	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
41.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
47.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
49.66	46.40	57.73	65.27	70.82	74.22	75.36	74.22	70.82	65.27	57.73	45.77
52.28	91.39	113.71	128.55	139.49	146.18	148.44	146.18	139.49	128.55	113.71	91.39
54.90	133.60	166.23	187.93	203.91	213.70	217.00	213.70	203.91	187.93	166.23	133.60
57.52	171.75	213.70	241.60	262.15	274.73	278.97	274.73	262.15	241.60	213.70	171.75
60.14	204.68	254.68	287.92	312.41	327.41	332.46	327.41	312.41	287.92	254.68	204.68
62.76	231.40	287.92	325.50	353.19	370.14	375.86	370.14	353.19	325.50	287.92	231.40
65.38	251.08	312.41	353.19	383.23	401.63	407.83	401.63	383.23	353.19	312.41	251.08
67.99	263.14	327.41	370.14	401.63	420.91	427.41	420.91	401.63	370.14	327.41	263.14
70.61	267.20	332.46	375.86	407.83	427.41	434.00	427.41	407.83	375.86	332.46	267.20
73.22	263.14	327.41	370.14	401.63	420.91	427.41	420.91	401.63	370.14	327.41	263.14
75.83	251.08	312.41	353.19	383.23	401.63	407.83	401.63	383.23	353.19	312.41	251.08
78.44	231.40	287.92	325.50	353.19	370.14	375.86	370.14	353.19	325.50	287.92	231.40
81.05	204.68	254.68	287.92	312.41	327.41	332.46	327.41	312.41	287.92	254.68	204.68
83.66	171.75	213.70	241.60	262.15	274.73	278.97	274.73	262.15	241.60	213.70	171.75
86.26	133.60	166.23	187.93	203.91	213.70	217.00	213.70	203.91	187.93	166.23	133.60
88.87	91.39	113.71	128.55	139.49	146.18	148.44	146.18	139.49	128.55	113.71	91.39
91.47	46.40	57.73	65.27	70.82	74.22	75.36	74.22	70.82	65.27	57.73	46.40
94.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

INCIDENT PLANETARY FLUX (BTU/Hr-SqFt)

SPACE END; INCIDENT THERMAL FLUX VS. TIME

LONG DURATION EXPOSURE FACILITY

AVERAGE INCIDENT HEAT FLUX (SOLAR + ALBEDO)
BTU/HR-SQFT

LOC	BETA ANGLE						20°	30°	40°	52°	
	-52°	-40°	-30°	-20°	-10°	0°					
ROW 1	6.03	7.99	9.37	10.47	23.86	43.76	68.27	98.82	141.04	182.52	234.22
ROW 2	6.38	19.54	35.49	51.88	67.19	83.99	99.09	112.30	125.46	138.73	162.39
ROW 3	53.69	69.99	81.70	91.34	98.79	103.88	106.94	107.54	105.96	102.14	95.95
ROW 4	116.22	115.85	114.58	111.62	106.70	99.38	90.54	79.48	66.76	52.48	33.48
ROW 5	191.95	149.94	127.50	108.49	90.03	71.67	53.83	36.49	20.34	7.96	6.06
ROW 6	245.39	190.93	147.40	103.11	57.70	27.90	11.17	10.37	9.27	7.89	5.90
ROW 7	234.92	183.04	141.58	99.36	68.72	44.11	20.91	10.47	9.37	7.99	6.01
ROW 8	163.42	139.81	126.43	113.22	99.21	84.47	68.62	52.37	35.81	19.79	6.47
ROW 9	96.72	103.04	106.87	108.55	107.89	104.84	99.59	92.07	82.29	70.61	53.92
ROW 10	33.65	51.93	67.30	80.10	91.26	100.32	107.55	112.51	115.39	116.79	116.70
ROW 11	6.08	7.97	20.46	36.77	54.25	72.32	90.71	109.28	128.30	150.81	192.24
ROW 12	5.93	7.89	9.27	10.37	11.17	28.08	58.02	103.40	147.61	191.19	245.15
SPACE	84.82	105.56	119.34	129.49	135.71	137.80	135.71	129.49	119.34	105.56	84.82
EARTH	39.82	42.10	44.28	46.14	47.34	47.79	47.34	46.14	44.28	42.10	39.82

This Page Intentionally Left Blank

APPENDIX B

ORBITAL INCIDENT HEAT FLUX > SOLAR, ALBEDO, & PLANET

Thermal Flux @ 10° Yaw (All Rows/Ends)

DAILY AVERAGE
(One Year Seasonal Cycle)



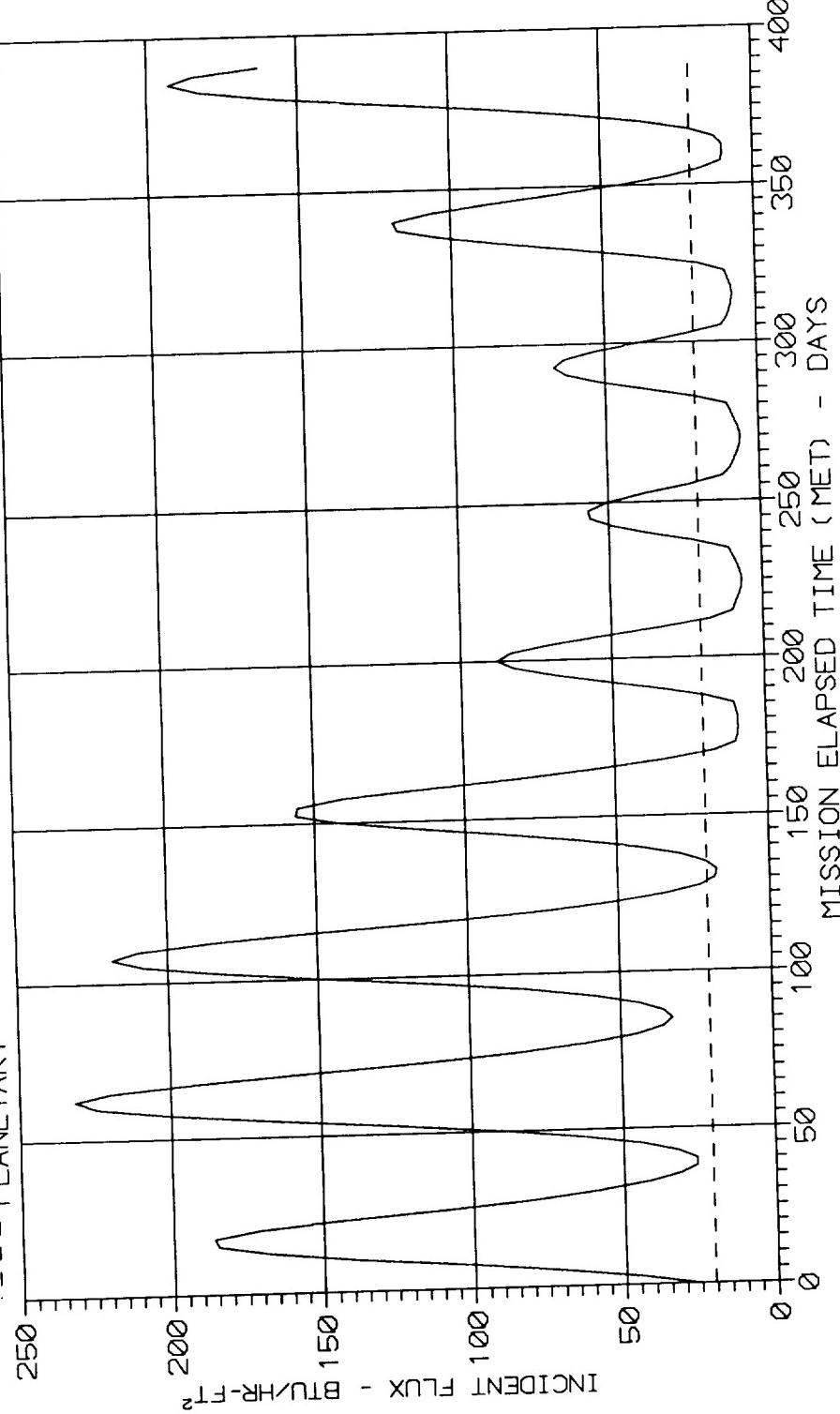
This page intentionally left blank

DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 1
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- ft^2
PLANETARY FLUX = 77 Btu/Hr- ft^2
ALBEDO = 31%

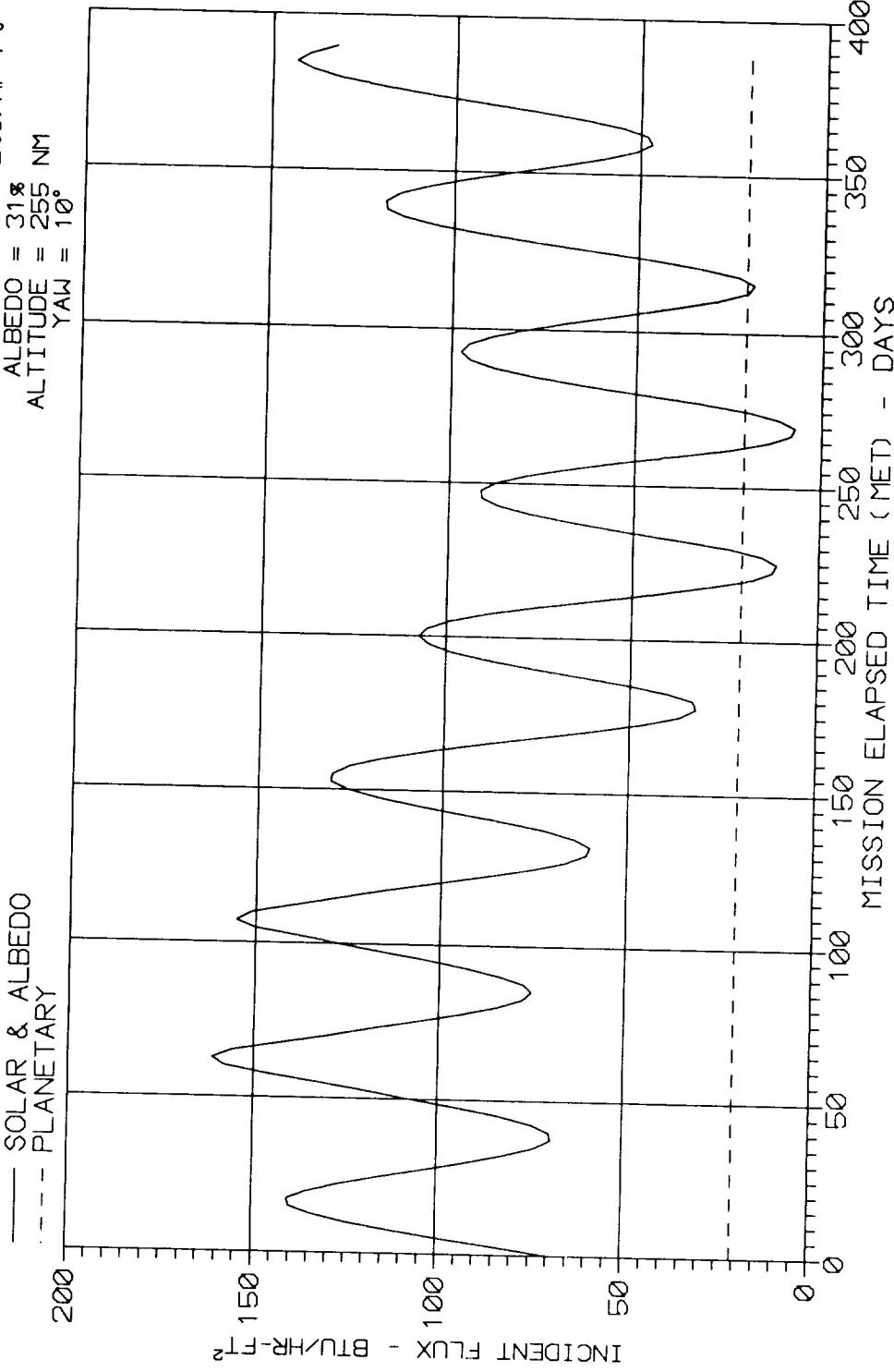
ALTITUDE = 255 NM
YAW = 10°

— SOLAR & ALBEDO
--- PLANETARY



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 2
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- ft^2
PLANETARY FLUX = 77 Btu/Hr- ft^2
ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

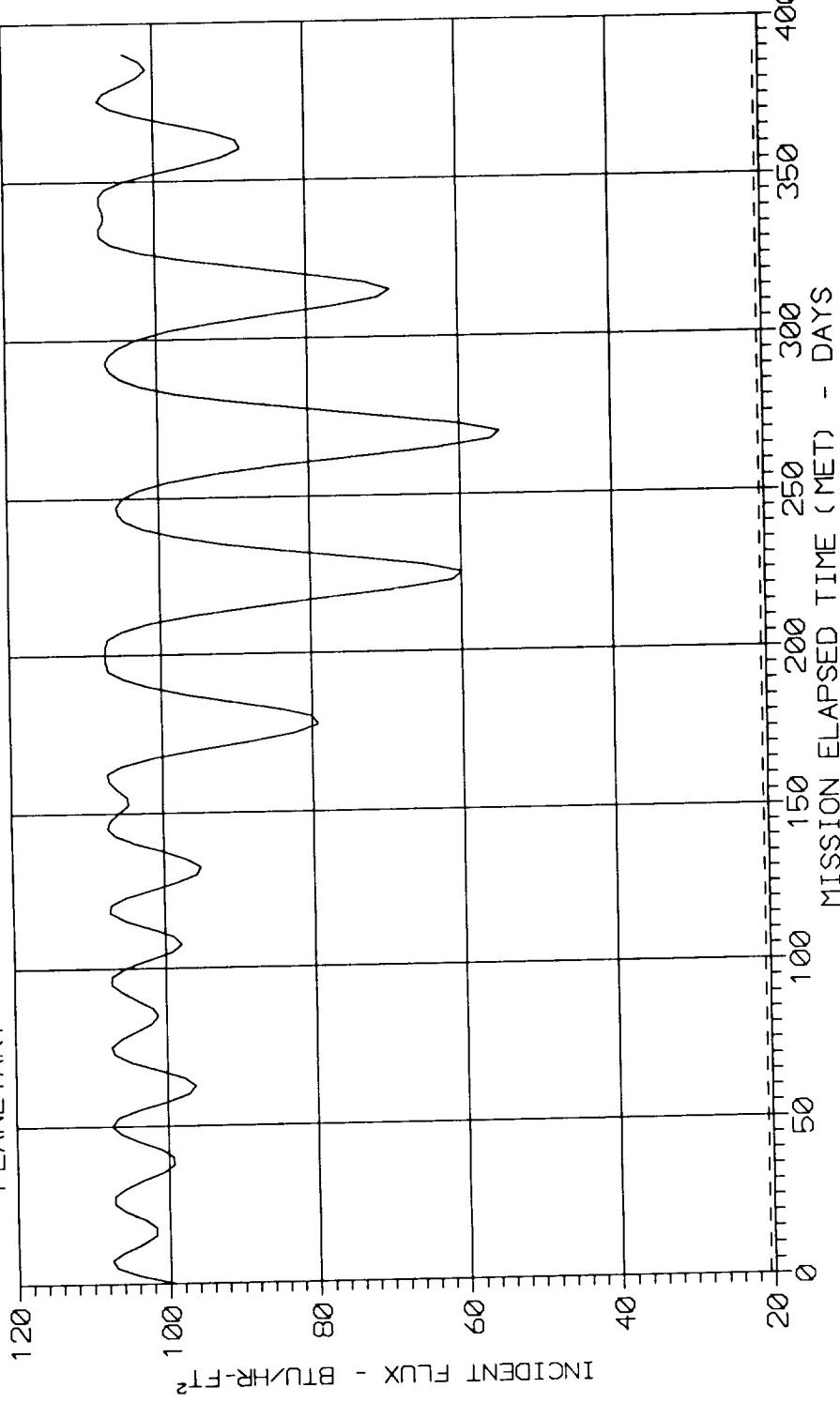


DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 3
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- ft^2
PLANETARY FLUX = 77 Btu/Hr- ft^2

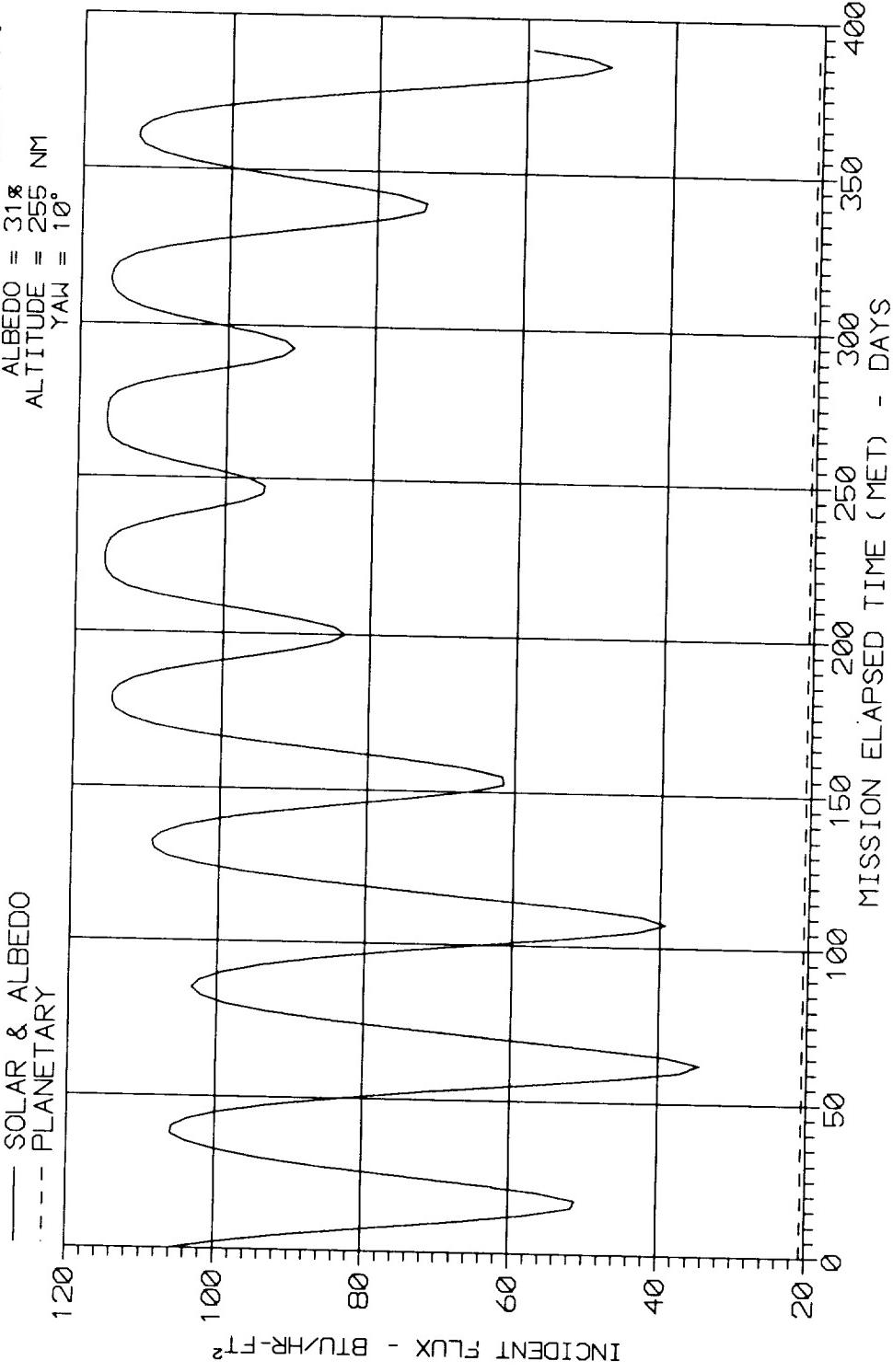
ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

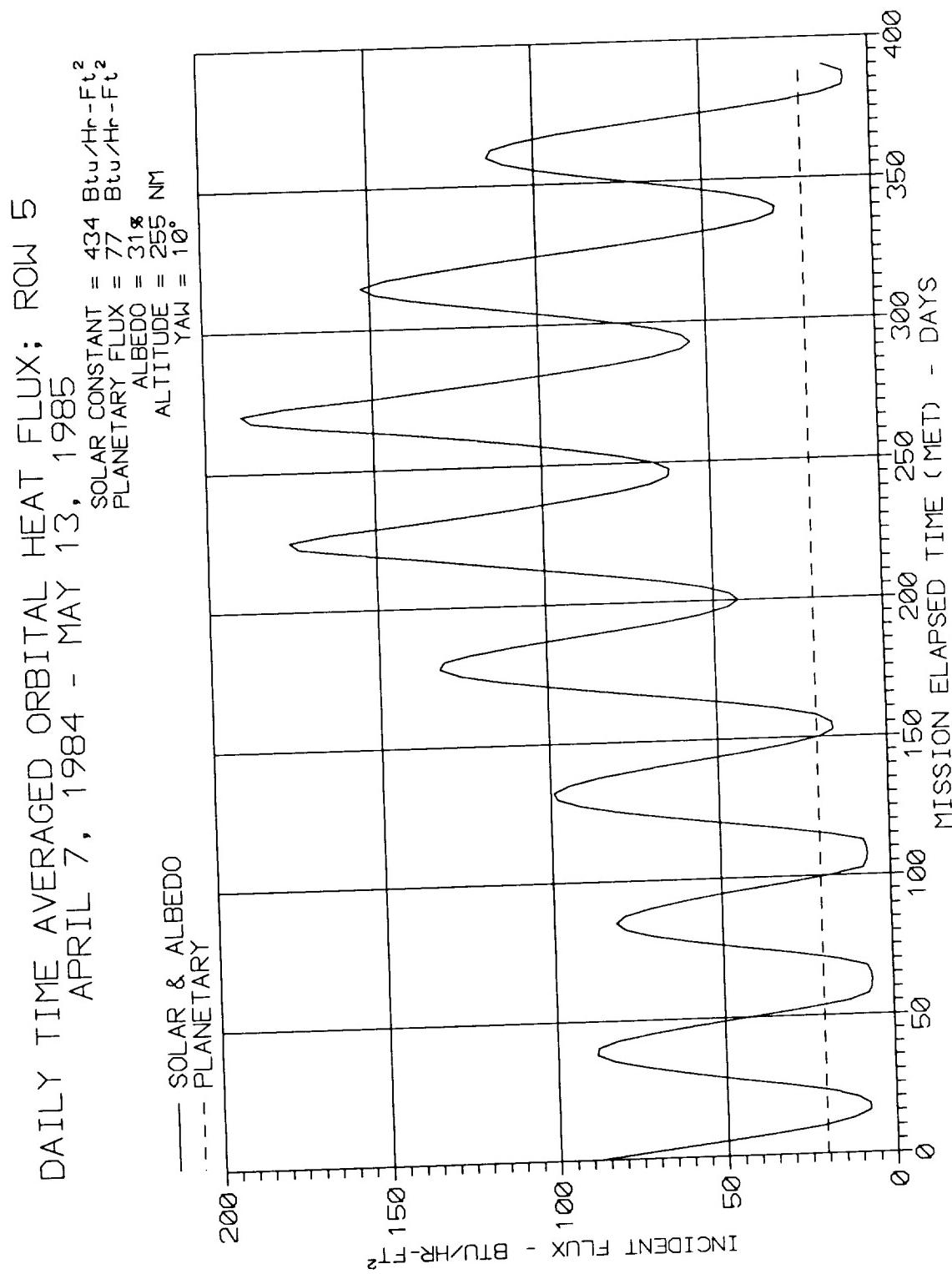
— SOLAR & ALBEDO
- - - PLANETARY



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 4
APRIL 7, 1984 - MAY 13, 1985

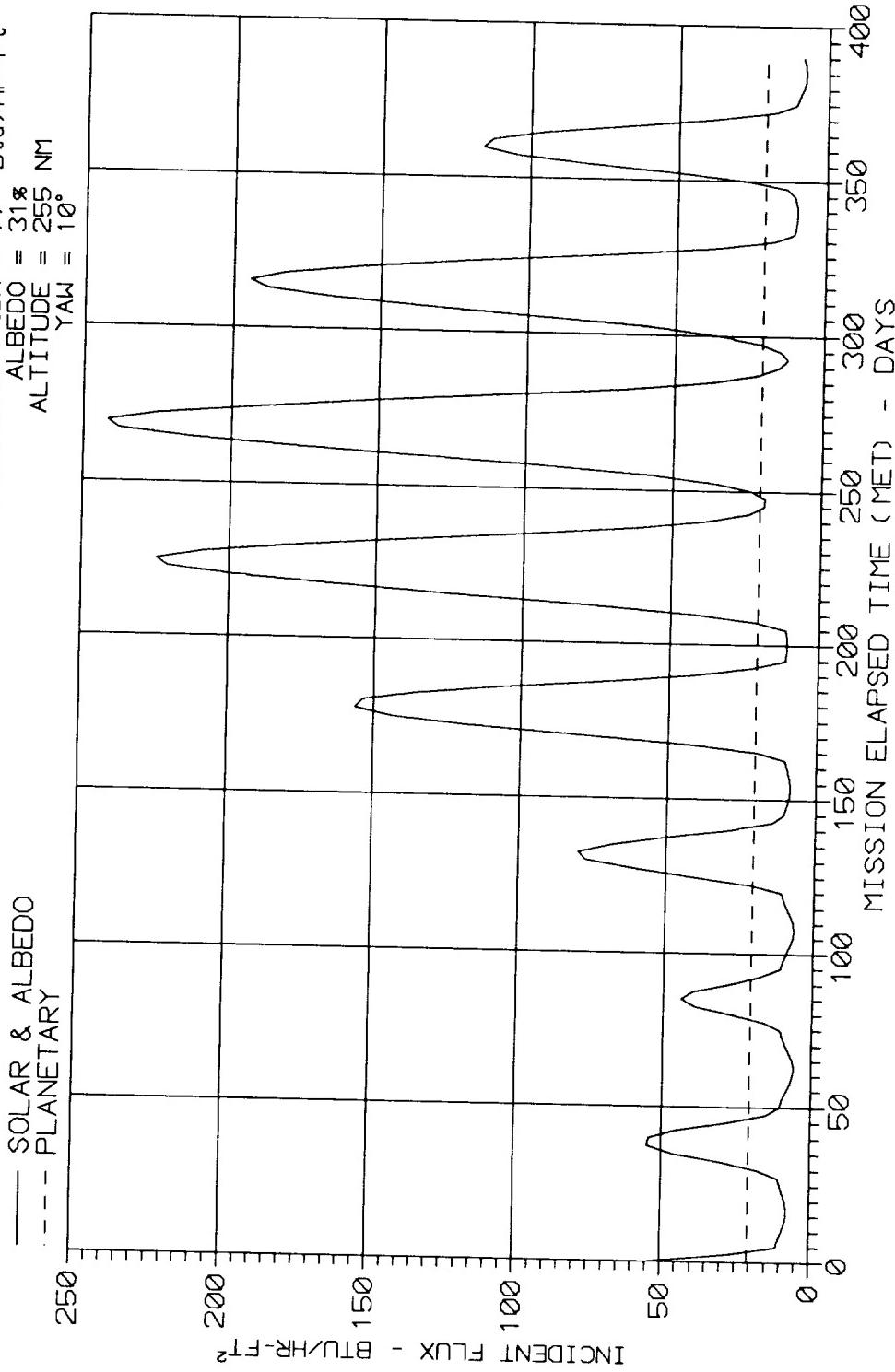
SOLAR CONSTANT = 434 Btu/Hr- Ft^2
PLANETARY FLUX = 77 Btu/Hr- Ft^2
ALBEDO = .318
ALTITUDE = 255 NM
YAW = 10°





DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 6
 APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- F_t^2
 PLANETARY FLUX = 77 Btu/Hr- F_t^2
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

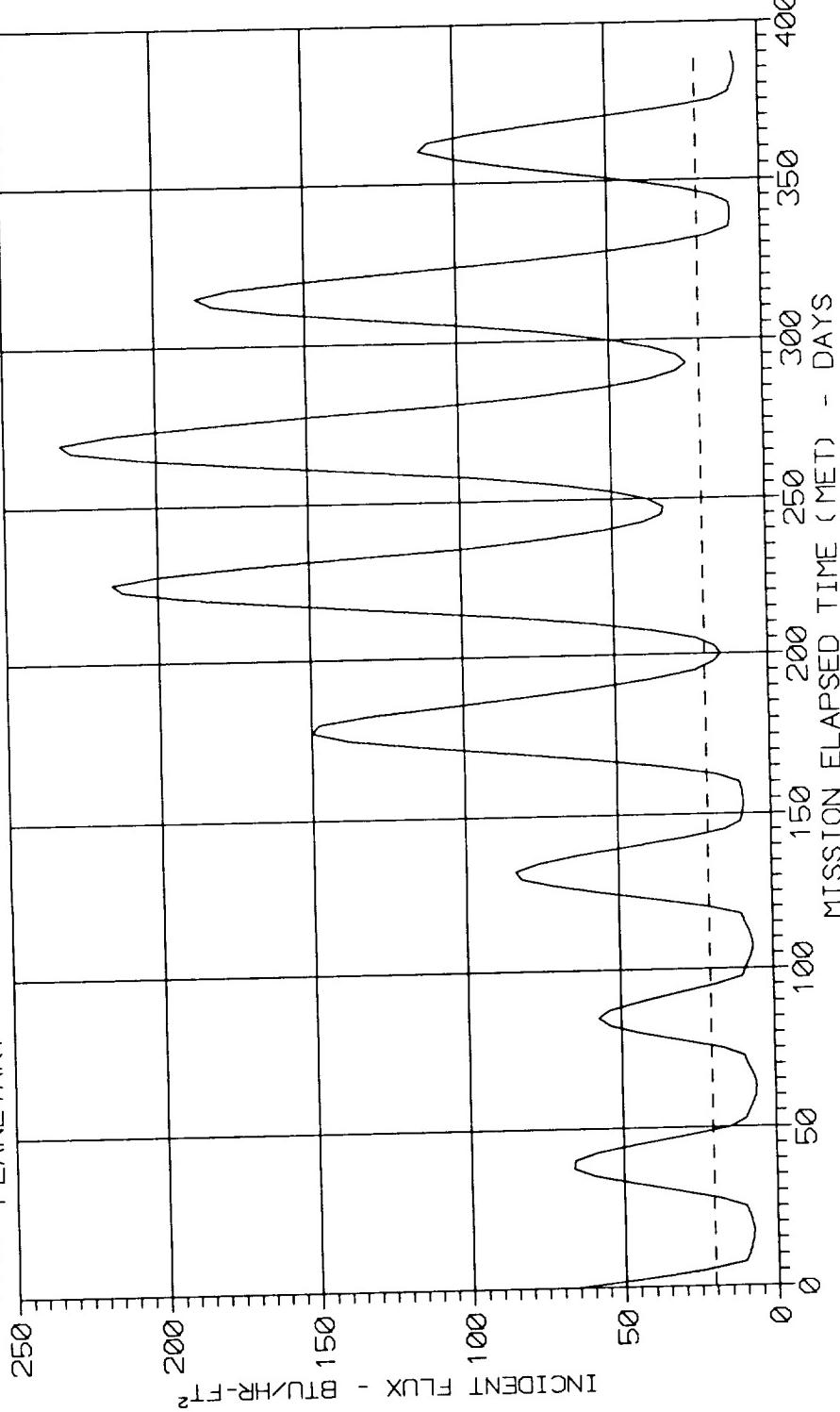


DAILY TIME AVERAGED ORBITAL HEAT FLUX: ROW 7
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = $434 \text{ Btu/Hr-} \text{ft}^2$
PLANETARY FLUX = $77 \text{ Btu/Hr-} \text{ft}^2$

ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

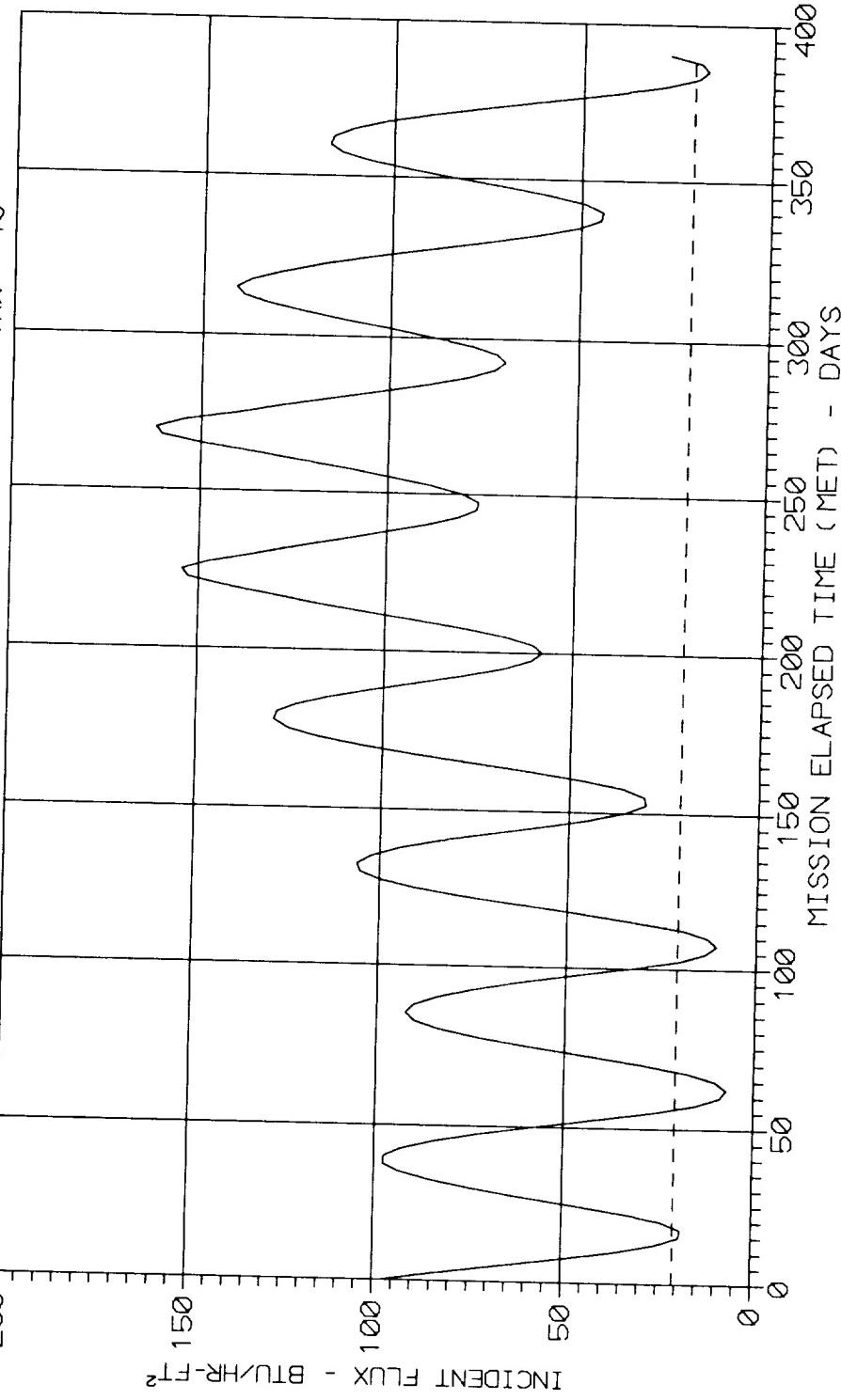
— SOLAR & ALBEDO
- - - PLANETARY



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 8
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/hr-ft²
PLANETARY FLUX = 77 Btu/hr-ft²
ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

— SOLAR & ALBEDO
--- PLANETARY

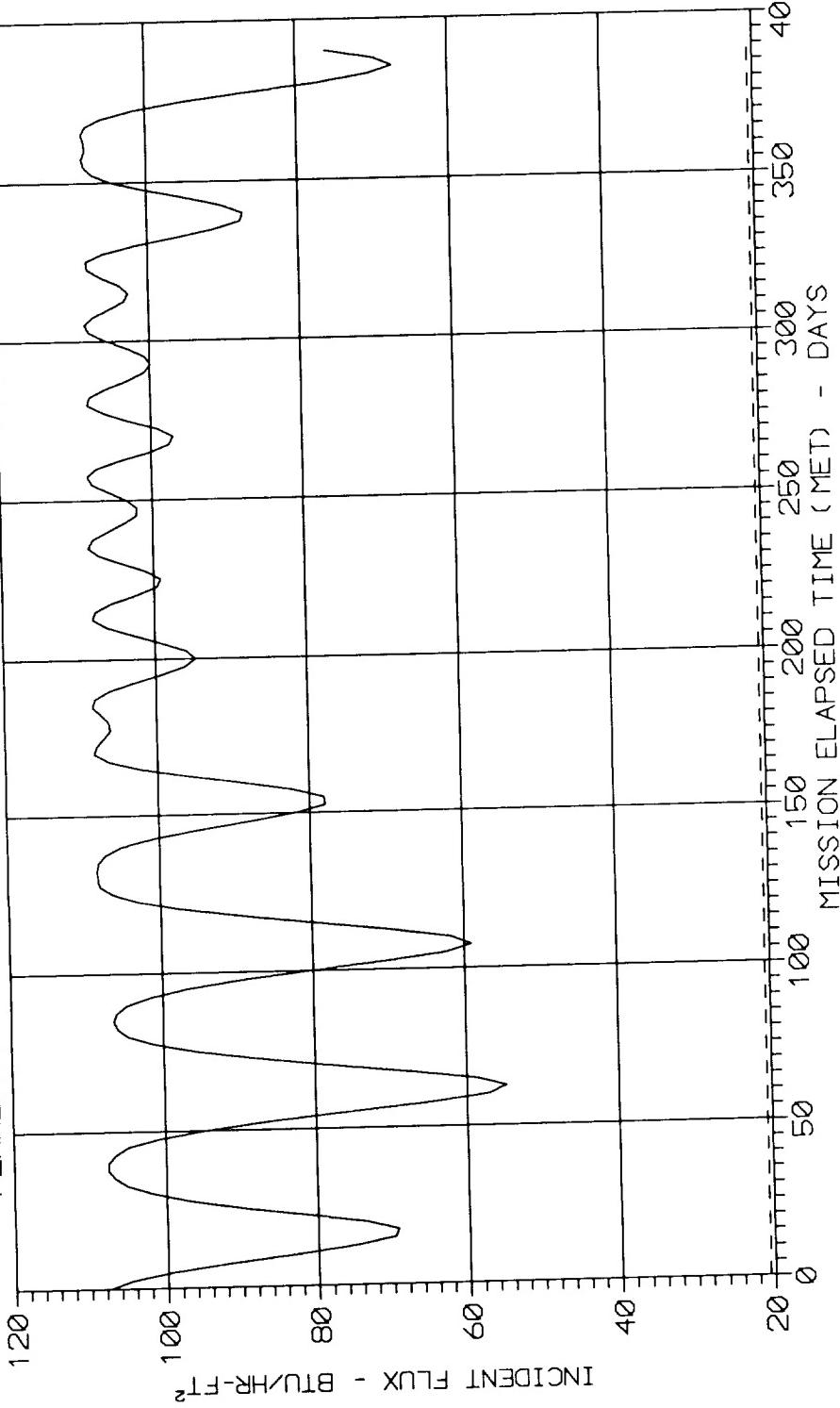


DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 9
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- F_t^2
PLANETARY FLUX = 77 Btu/Hr- F_t^2
ALBEDO = 31%

ALTITUDE = 255 NM
YAW = 10°

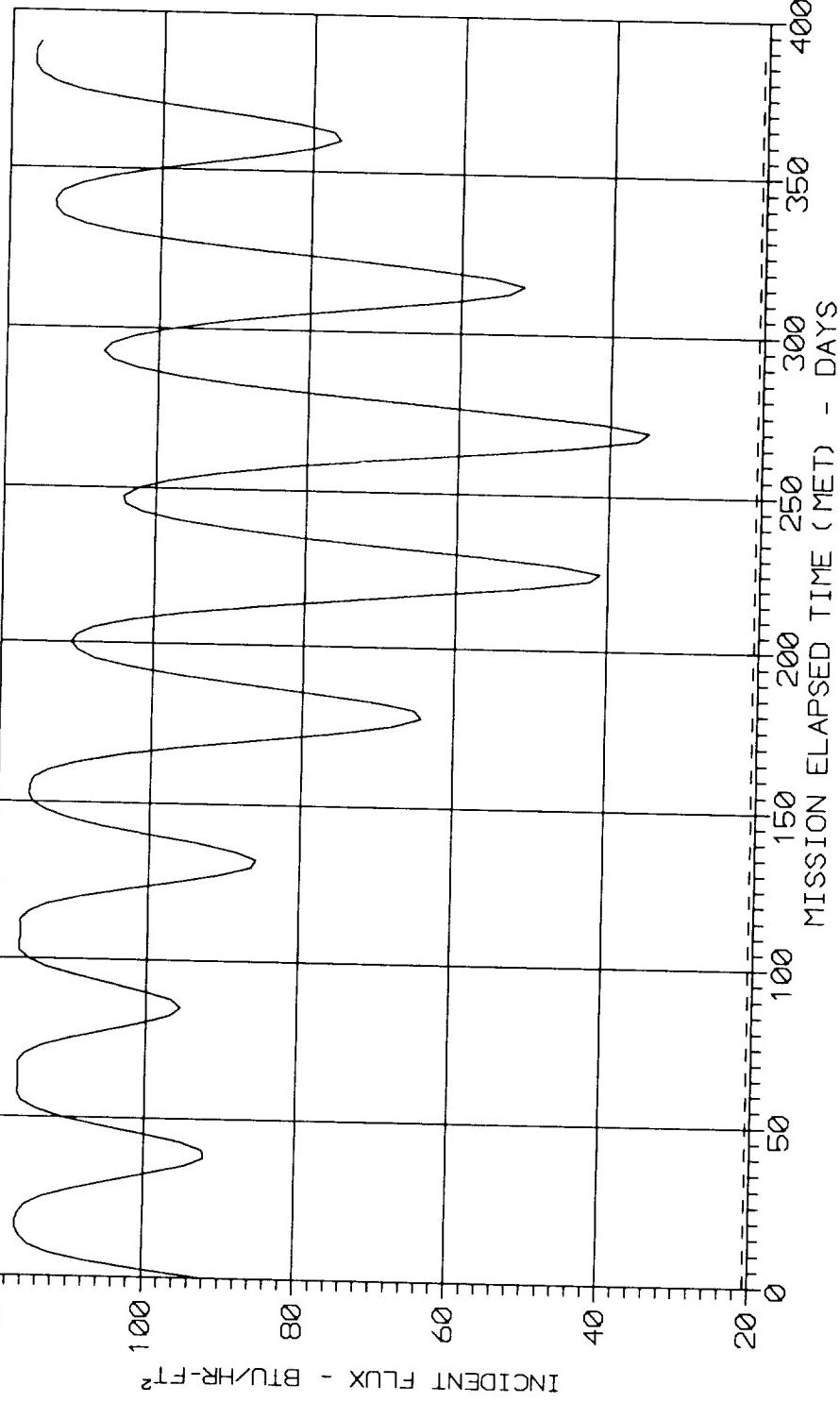
— SOLAR & ALBEDO
- - - PLANETARY



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 10
APRIL 7, 1984 - MAY 13, 1985

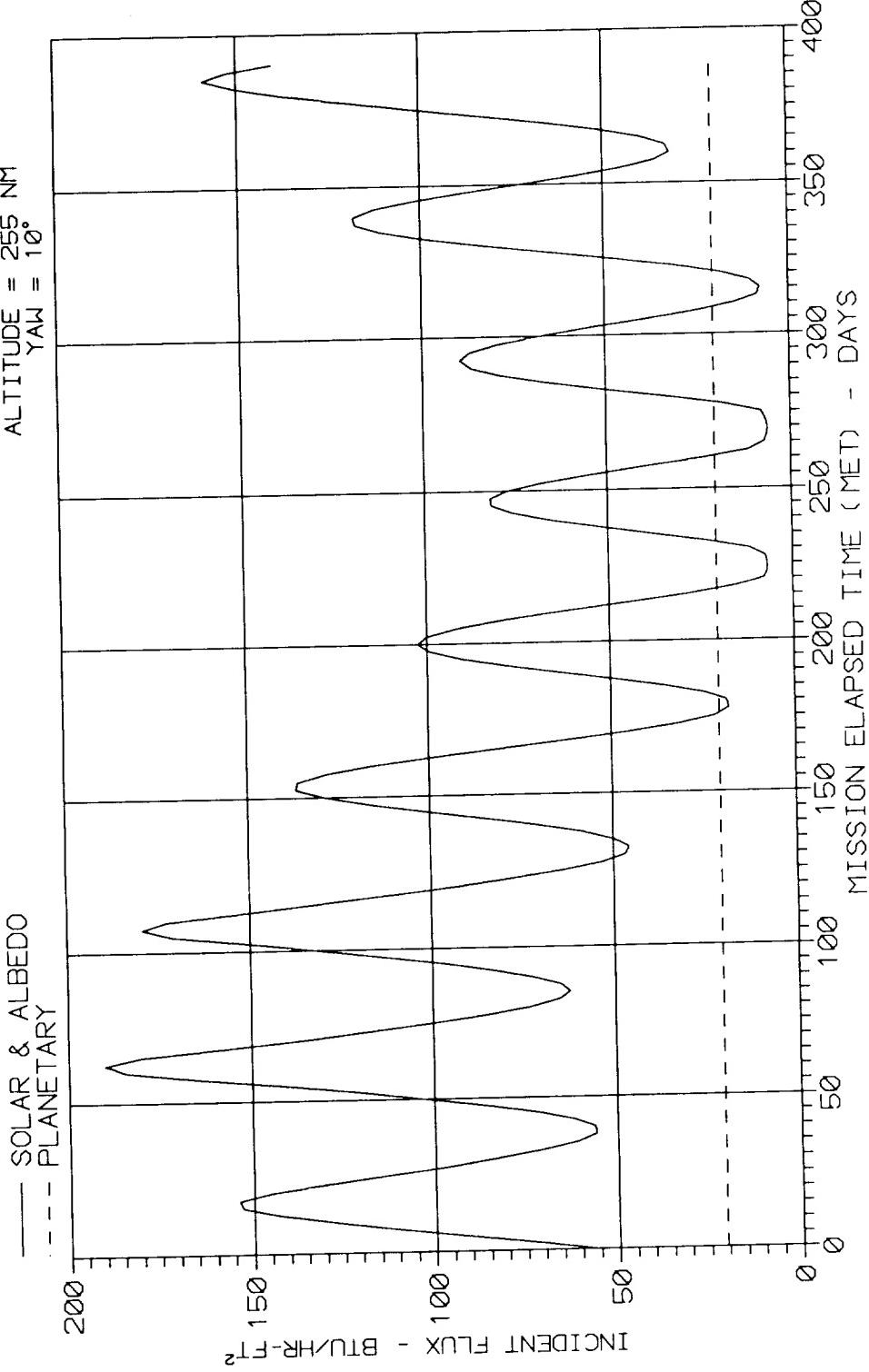
SOLAR CONSTANT = 434 Btu/Hr- F_t^2
PLANETARY FLUX = 77 Btu/Hr- F_t^2
ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

— SOLAR & ALBEDO
--- PLANETARY



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 11
 APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = $434 \text{ Btu}/\text{Hr}\cdot\text{Ft}^2$
 PLANETARY FLUX = $77 \text{ Btu}/\text{Hr}\cdot\text{Ft}^2$
 ALBEDO = .318
 ALTITUDE = 255 NM
 YAW = 10°



DAILY TIME AVERAGED ORBITAL HEAT FLUX; ROW 12
APRIL 7, 1984 - MAY 13, 1985

SOLAR CONSTANT = 434 Btu/Hr- ft^2

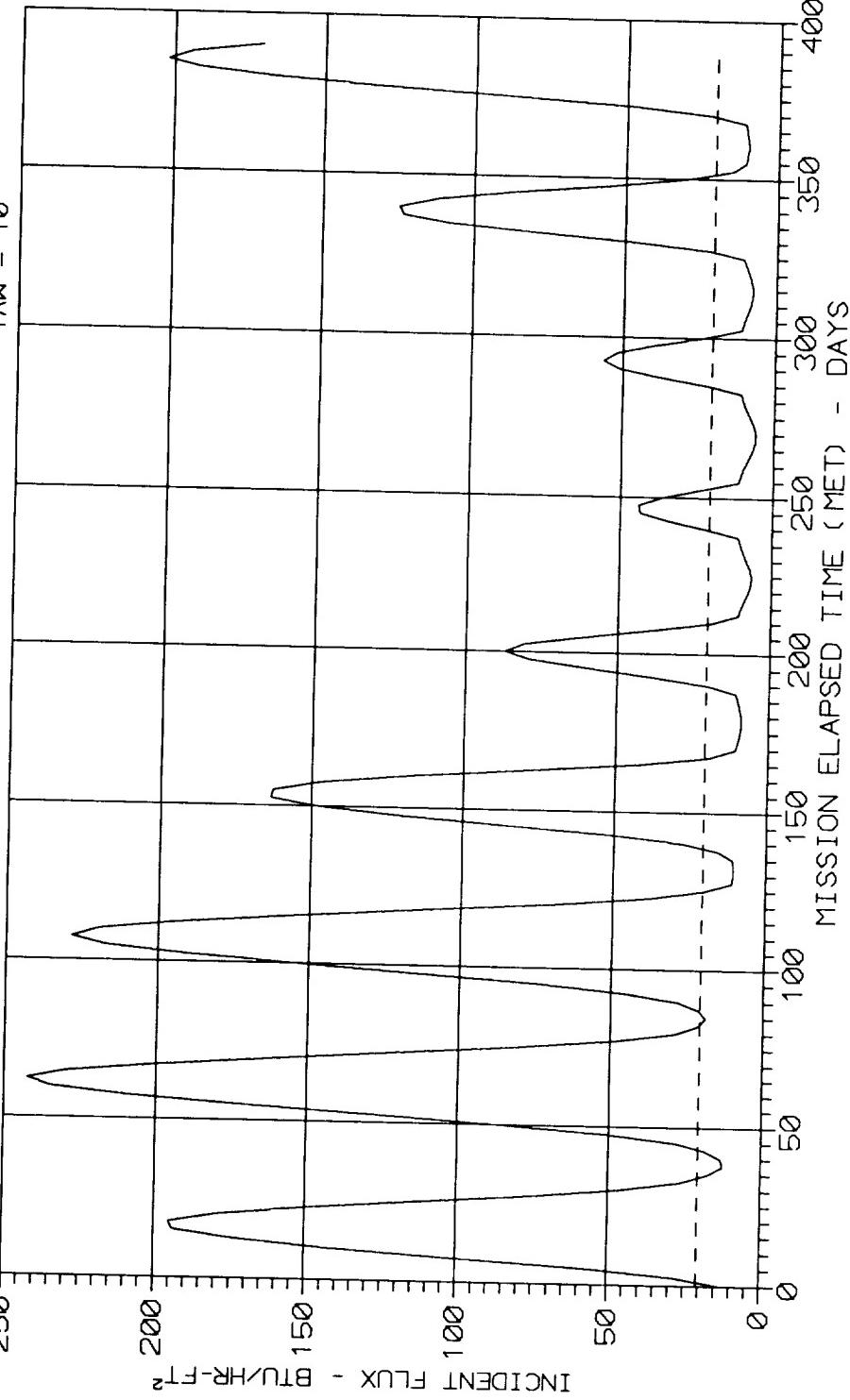
PLANETARY FLUX = 77 Btu/Hr- ft^2

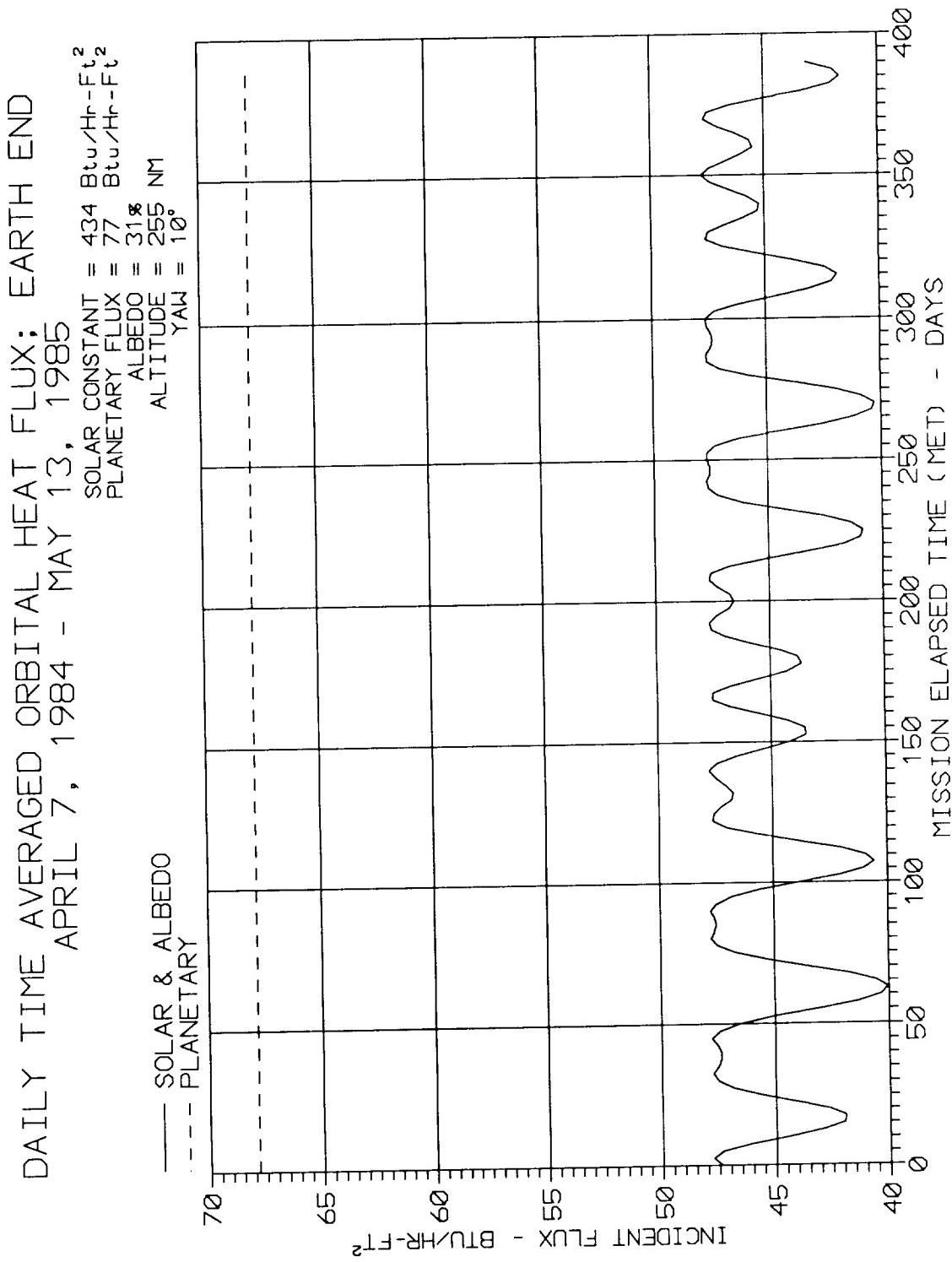
ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°

— SOLAR & ALBEDO
--- PLANETARY





DAILY TIME AVERAGED ORBITAL HEAT FLUX; SPACE END
APRIL 7, 1984 - MAY 13, 1985

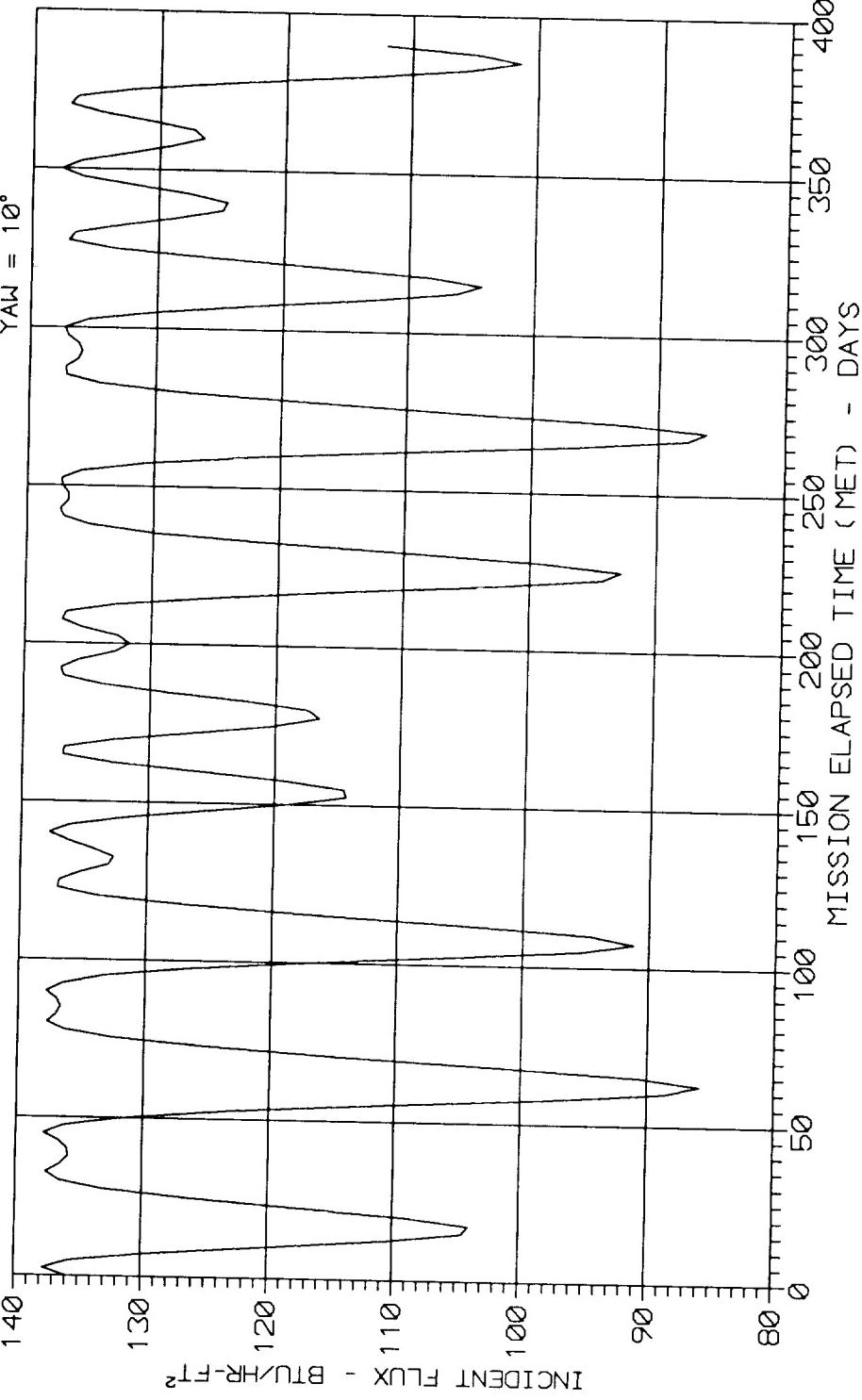
SOLAR CONSTANT = 434 Btu/Hr- ft^2

PLANETARY FLUX = N/A

ALBEDO = N/A

ALTITUDE = 255 NM

YAW = 10°



TIME Days	BETA ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH SPACE END
0	-9.07	25.71	69.43	99.26	106.02	88.32	54.94	66.43	97.82	107.59	92.11	55.93	12.74	47.38
1	-5.51	32.81	74.94	101.08	103.41	81.78	44.32	57.66	92.51	106.51	95.34	62.37	18.77	47.54
2	-1.78	40.23	80.71	102.97	100.68	74.93	33.21	48.49	86.96	105.38	98.72	69.11	25.07	47.71
3	2.12	48.96	86.62	104.53	97.51	67.89	24.36	39.84	80.98	103.73	101.86	76.22	34.43	47.69
4	6.08	58.67	92.53	105.74	94.01	60.82	17.73	31.88	74.76	101.65	104.73	83.50	46.28	47.52
5	10.12	68.64	98.55	106.95	90.41	53.62	11.16	23.83	68.41	99.50	107.62	90.93	58.57	47.33
6	14.12	80.86	104.12	107.20	85.98	46.69	10.84	18.42	61.92	96.49	109.60	98.36	76.72	46.85
7	18.11	93.04	109.67	107.46	81.57	39.77	10.52	13.03	55.44	93.49	111.58	105.77	94.82	46.37
8	21.96	107.08	114.87	107.26	76.99	33.34	10.15	10.25	49.13	90.16	113.08	113.00	112.05	45.78
9	25.67	122.75	119.76	106.66	72.27	27.36	9.75	9.85	42.98	86.52	114.15	120.06	128.46	45.09
10	29.13	137.37	124.31	106.10	67.87	21.79	9.37	9.47	37.25	83.13	115.14	126.64	143.76	44.44
11	32.30	150.58	128.51	105.08	63.47	17.53	8.95	9.05	32.12	79.60	115.71	133.51	157.64	43.78
12	35.12	162.30	132.25	104.00	59.44	14.02	8.56	8.67	27.60	76.30	116.11	139.90	169.95	43.16
13	37.47	172.05	135.37	103.10	56.09	11.10	8.24	8.35	23.84	73.56	116.44	145.22	180.19	42.64
14	39.33	179.74	137.83	102.40	53.44	8.79	7.98	8.09	20.87	71.39	116.71	149.41	188.27	42.24
15	40.58	185.02	139.86	101.84	51.57	7.87	7.79	7.90	19.15	69.81	116.80	152.92	193.80	41.99
16	41.20	187.69	141.08	101.52	50.58	7.77	7.69	7.80	18.45	68.94	116.79	155.06	196.59	41.87
17	41.16	187.52	141.01	101.54	50.65	7.78	7.70	7.81	18.50	69.00	116.79	154.92	196.41	41.88
18	40.47	184.56	139.65	101.90	51.73	7.89	7.81	7.92	19.26	69.95	116.80	152.55	193.32	42.00
19	39.19	179.17	137.65	102.45	53.64	8.97	8.00	8.11	21.09	71.55	116.69	149.10	187.67	42.27
20	37.34	171.51	135.20	103.15	56.27	11.26	8.26	8.36	24.04	73.71	116.43	144.92	179.63	42.67
21	35.05	161.99	132.16	104.03	59.55	14.11	8.57	8.68	27.72	76.39	116.10	139.73	169.62	43.17
22	32.34	150.77	128.57	105.06	63.41	17.48	8.95	9.05	32.05	79.54	115.72	133.61	157.83	43.77
23	29.37	138.38	124.63	106.06	67.56	21.40	9.34	9.44	36.85	82.90	115.21	127.10	144.83	44.40
24	26.14	124.75	120.38	106.59	71.67	26.60	9.69	9.79	42.20	86.06	114.28	120.96	130.55	45.00
25	22.79	110.59	115.97	107.13	75.93	32.00	10.06	10.16	47.75	89.34	113.32	114.58	133.61	43.77
26	19.32	96.75	111.35	107.54	80.23	37.67	10.42	11.39	53.47	92.58	112.18	108.02	100.33	42.27
27	15.85	86.13	106.52	107.31	84.07	43.69	10.70	16.08	59.11	95.19	110.46	101.57	84.56	44.40
28	12.46	75.78	101.80	107.10	87.82	49.57	10.97	20.67	64.62	97.74	108.78	95.27	69.17	47.05
29	9.57	67.21	97.74	106.81	90.92	54.60	11.89	24.86	69.29	99.82	107.25	89.92	56.73	47.36
30	6.25	59.07	92.78	105.79	93.86	60.53	17.46	31.54	74.50	101.56	104.85	83.81	46.78	47.51
31	3.21	51.62	88.24	104.86	96.55	65.95	22.54	37.66	79.28	103.16	102.65	78.22	37.68	47.65
32	0.38	44.69	84.02	103.99	99.05	71.00	27.28	43.35	83.72	104.64	100.60	73.01	29.21	47.77
33	-2.17	39.45	80.10	102.78	100.97	75.66	34.38	49.45	87.54	105.50	98.36	68.40	24.41	47.69
34	-4.40	35.00	76.65	101.64	102.60	79.76	41.04	54.95	90.87	106.17	96.34	64.36	20.63	47.59
35	-6.25	31.32	73.79	100.70	103.96	83.15	46.54	59.49	93.62	106.73	94.67	61.02	17.51	47.51
36	-7.70	28.44	71.55	99.66	105.01	85.80	50.85	63.05	95.77	107.17	93.36	58.41	15.06	47.44
37	-8.70	26.45	70.00	99.45	105.75	87.64	53.83	65.51	97.26	107.48	92.45	56.60	13.37	47.40
38	-9.25	25.36	69.16	99.17	106.15	88.64	55.46	66.86	98.08	107.64	91.95	55.61	12.45	47.37
39	-9.30	25.25	69.07	99.15	106.19	88.74	55.62	67.00	98.16	107.66	91.90	55.52	12.35	47.37
40	-8.87	26.11	69.73	99.36	105.87	87.96	54.35	65.94	97.52	107.53	92.29	56.29	13.08	47.39
41	-7.96	27.91	71.14	99.83	105.21	86.29	51.64	63.71	96.17	107.25	93.11	57.93	14.61	47.43
42	-6.60	30.63	73.25	100.52	104.21	83.79	47.58	60.35	94.14	106.84	94.35	60.39	16.92	47.49

TIME	BETA Days	ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH SPACE END
43	-4.80	34.21	76.03	101.44	102.90	80.49	42.22	55.93	91.46	106.30	95.98	63.64	19.96	47.57	136.80
44	-2.61	38.58	79.43	102.55	101.29	76.46	35.68	50.52	88.19	105.63	97.97	67.61	23.67	47.67	137.26
45	-0.05	43.67	83.38	103.85	99.42	71.76	28.06	44.23	84.39	104.86	100.28	72.23	27.99	47.79	137.79
46	2.83	50.71	87.68	104.75	96.88	66.62	23.17	38.41	79.87	103.35	102.38	77.53	36.56	47.66	137.21
47	5.99	58.45	92.40	105.71	94.08	60.98	17.88	32.06	74.91	101.70	104.66	83.34	46.01	47.52	136.55
48	9.39	66.76	97.46	106.75	91.08	54.93	12.20	25.23	69.57	99.91	107.12	89.58	56.18	47.37	135.84
49	12.96	77.32	102.50	107.13	87.26	48.69	10.93	19.98	63.80	97.36	109.03	96.21	71.47	46.98	133.87
50	16.69	88.72	107.70	107.37	83.14	42.22	10.63	14.94	57.74	94.56	110.88	103.14	88.40	46.54	131.55
51	20.51	100.99	112.98	107.50	78.83	35.66	10.31	10.41	51.52	91.57	112.67	110.26	105.68	46.04	128.97
52	24.40	117.39	118.09	106.87	73.89	29.41	9.89	9.99	45.09	87.76	113.78	117.65	122.85	45.32	125.03
53	28.27	133.74	123.18	106.24	68.96	23.18	9.46	9.56	38.68	83.97	114.89	125.01	139.96	44.60	121.10
54	32.10	149.77	128.25	105.16	63.76	17.77	8.98	9.08	32.44	79.82	115.69	133.06	156.78	43.82	116.44
55	35.81	165.16	133.17	103.74	58.46	13.16	8.47	8.57	26.50	75.50	116.21	141.46	172.95	43.01	111.33
56	39.34	179.79	137.84	102.39	53.42	8.78	7.98	8.09	20.85	71.38	116.71	149.44	188.32	42.23	106.47
57	42.59	193.71	143.84	100.80	48.37	7.55	7.46	7.57	16.90	67.00	116.78	159.86	202.86	41.62	101.08
58	45.48	206.15	149.54	99.31	43.80	7.09	6.99	7.09	13.68	62.98	116.76	169.81	215.85	41.09	96.08
59	47.92	216.66	154.35	98.05	39.93	6.71	6.58	6.69	10.96	59.59	116.74	178.21	226.82	40.65	91.87
60	49.70	224.33	157.86	97.13	37.12	6.42	6.29	6.39	8.97	57.11	116.73	184.34	234.83	40.33	88.79
61	50.84	229.20	160.09	96.54	35.32	6.24	6.10	6.20	7.71	55.54	116.72	188.23	239.91	40.12	86.83
62	51.40	231.63	161.20	96.25	34.43	6.16	6.01	6.11	7.08	54.76	116.71	190.17	242.44	40.02	85.86
63	51.19	230.74	160.79	96.36	34.76	6.19	6.04	6.14	7.31	55.04	116.72	189.46	241.51	40.06	86.22
64	50.23	226.62	158.91	96.85	36.28	6.34	6.20	6.30	8.38	56.38	116.72	186.16	237.21	40.23	87.87
65	48.58	219.51	155.65	97.70	38.89	6.60	6.47	6.58	10.22	58.67	116.74	180.48	229.79	40.53	90.72
66	46.36	209.93	151.27	98.85	42.41	6.95	6.84	6.95	12.70	61.76	116.75	172.83	219.80	40.93	94.57
67	43.63	198.15	145.87	100.27	46.74	7.39	7.29	7.40	15.75	65.57	116.77	163.41	207.50	41.43	99.29
68	40.54	184.87	139.79	101.86	51.62	7.87	7.80	7.91	19.19	69.86	116.80	152.80	193.64	41.99	104.62
69	37.14	170.67	134.93	103.23	56.56	11.51	8.28	8.39	24.37	73.95	116.40	144.46	178.74	42.72	109.50
70	33.59	155.94	130.22	104.59	61.63	15.93	8.77	8.88	30.06	78.09	115.90	136.43	163.26	43.49	114.39
71	29.91	140.66	125.34	105.97	66.87	20.53	9.28	9.38	35.96	82.37	115.36	128.13	147.22	44.30	119.43
72	26.15	124.80	120.40	106.58	71.65	26.58	9.69	9.79	42.18	86.05	114.29	120.98	130.61	45.00	123.24
73	22.43	109.10	115.50	107.19	76.38	32.57	10.10	10.20	48.34	89.69	113.22	113.91	114.17	45.69	127.02
74	18.73	94.93	110.53	107.50	80.89	38.70	10.47	12.19	34.44	93.03	111.89	106.91	97.63	46.29	130.28
75	15.17	84.06	105.57	107.27	84.82	44.87	10.76	17.00	60.22	95.70	110.12	100.31	81.48	46.72	132.50
76	11.72	73.53	100.78	107.05	88.64	50.84	11.03	21.66	65.81	98.29	108.41	93.91	65.84	47.13	134.64
77	8.51	64.61	96.15	106.48	91.86	56.50	13.67	27.00	70.96	100.37	106.48	87.96	53.55	47.41	136.02
78	5.51	57.26	91.68	105.57	94.51	61.85	18.69	33.03	75.66	101.95	104.31	82.45	44.57	47.54	136.65
79	2.81	50.66	87.65	104.74	96.90	66.66	23.20	38.45	79.90	103.36	102.36	77.49	36.50	47.66	137.21
80	0.41	44.78	84.07	104.01	99.02	70.94	27.22	43.28	83.67	104.62	100.63	73.08	29.31	47.77	137.71
81	-1.60	40.58	80.98	103.07	100.55	74.61	32.68	48.05	86.69	105.32	98.88	69.43	25.37	47.72	137.47
82	-3.23	37.34	78.46	102.24	101.74	77.60	37.53	52.06	89.12	105.82	97.40	66.48	22.62	47.64	137.12
83	-4.41	34.99	76.64	101.64	102.61	79.77	41.05	54.96	90.88	106.18	96.34	64.35	20.62	47.59	136.88
84	-5.16	33.50	75.48	101.25	103.16	81.15	43.29	56.81	91.99	106.40	95.65	62.99	19.35	47.56	136.72
85	-5.43	32.96	75.06	101.12	103.35	81.64	44.09	57.47	92.40	106.49	95.41	62.51	18.90	47.55	136.67

TIME Days	BETA ANGLE	EARTH SPACE											
		ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12
86	-5.24	33.35	75.36	101.21	103.21	81.28	43.51	57.00	92.71	106.43	95.59	62.86	19.23
87	-4.57	34.67	76.39	101.55	102.73	80.06	41.53	55.36	91.12	106.23	96.19	64.06	20.35
88	-3.46	36.88	78.11	102.12	101.91	78.02	38.22	52.62	89.46	105.89	97.20	66.07	22.23
89	-1.92	39.95	80.49	102.90	100.78	75.19	33.63	48.83	87.17	105.42	98.59	68.85	24.84
90	0.03	43.85	83.51	103.89	99.35	71.61	27.85	44.04	84.26	104.82	100.35	72.38	28.18
91	2.30	49.41	86.90	104.58	97.34	67.56	24.06	39.48	80.70	103.63	101.99	76.55	34.97
92	4.66	55.18	90.41	105.31	95.26	63.36	20.11	34.74	77.00	102.39	103.70	80.89	42.03
93	7.48	62.09	94.62	106.17	92.77	58.33	15.39	29.06	72.57	100.91	105.74	86.07	50.47
94	10.61	70.14	99.23	106.98	89.86	52.77	11.12	23.16	67.61	99.13	107.86	91.85	60.81
95	13.91	80.21	103.82	107.19	86.22	47.05	10.86	18.70	62.26	96.65	109.50	97.97	75.77
96	17.39	90.84	108.66	107.41	82.37	41.02	10.58	14.00	56.61	94.03	111.22	104.43	91.55
97	20.94	102.78	113.53	107.43	78.29	34.98	10.27	10.37	50.82	91.15	112.79	111.06	107.55
98	24.57	118.10	118.31	106.84	73.67	29.14	9.87	9.97	44.81	87.60	113.83	117.97	123.59
99	28.17	133.30	123.05	106.26	69.09	23.34	9.47	9.57	38.85	84.08	114.86	124.81	139.50
100	31.73	148.20	127.75	105.30	64.29	18.24	9.03	9.13	33.04	80.26	115.63	132.21	155.14
101	35.13	162.32	132.26	104.00	59.44	14.02	8.56	8.67	27.60	76.30	116.11	139.90	169.96
102	38.36	175.72	136.54	102.77	54.82	10.00	8.12	8.22	22.42	72.53	116.57	147.21	184.04
103	41.27	187.99	141.22	101.49	50.47	7.76	7.68	7.79	18.38	68.85	116.79	155.29	196.89
104	43.82	198.97	146.25	100.17	46.44	7.36	7.26	7.37	15.54	65.30	116.77	164.07	208.35
105	45.87	207.81	150.30	99.11	43.19	7.03	6.92	7.03	13.25	62.45	116.76	171.13	217.58
106	47.35	214.20	153.22	98.34	40.84	6.80	6.68	6.78	11.59	60.38	116.74	176.24	224.25
107	48.17	217.72	154.84	97.92	39.54	6.67	6.54	6.65	10.68	59.25	116.74	179.06	227.93
108	48.28	218.19	155.05	97.86	39.37	6.65	6.52	6.63	10.56	59.10	116.74	179.43	228.41
109	47.66	215.53	153.83	98.18	40.35	6.75	6.63	6.73	11.25	59.95	116.74	177.31	225.65
110	46.33	209.80	151.21	98.87	42.46	6.96	6.85	6.95	12.73	61.80	116.75	172.72	219.66
111	44.40	201.48	147.40	99.87	45.51	7.26	7.16	7.27	14.88	64.49	116.77	166.08	210.98
112	41.89	190.68	142.45	101.16	49.48	7.66	7.58	7.69	17.68	67.98	116.79	157.45	199.71
113	38.97	178.28	137.36	102.53	53.94	9.23	8.03	8.14	21.43	71.81	116.66	148.61	186.73
114	35.67	164.55	132.97	103.80	58.67	13.35	8.49	8.59	26.73	75.67	116.19	141.12	172.31
115	32.12	149.82	128.27	105.15	63.74	17.76	8.98	9.08	32.42	79.81	115.69	133.09	156.84
116	28.35	134.05	123.28	106.23	68.86	23.05	9.45	9.55	38.55	83.90	114.92	125.15	140.30
117	24.49	117.78	118.21	106.85	73.77	29.26	9.88	9.98	44.93	87.67	113.81	117.82	123.25
118	20.57	101.21	113.05	107.49	78.76	35.58	10.31	10.41	51.43	91.51	112.68	110.36	105.92
119	16.59	88.39	107.55	107.36	83.26	42.41	10.64	10.59	57.91	94.64	110.83	102.94	87.91
120	12.69	76.48	102.12	107.11	87.57	49.17	10.95	20.35	64.24	97.57	103.78	101.80	76.05
121	8.84	65.43	96.65	106.58	91.57	55.90	13.11	26.32	70.43	100.20	106.72	88.58	54.55
122	5.12	56.32	91.10	105.45	94.85	62.54	19.34	33.81	76.27	102.15	104.03	81.74	43.41
123	2.03	48.74	86.48	104.50	97.59	68.05	24.52	40.03	81.13	103.78	108.89	95.70	70.22
124	-1.37	41.04	81.34	103.18	100.38	74.18	31.99	47.48	86.35	105.25	99.09	69.85	25.76
125	-4.45	34.92	76.58	101.62	102.63	79.83	41.16	55.05	90.93	106.19	96.30	64.29	20.56
126	-7.20	29.43	72.31	100.21	104.65	84.90	49.38	61.84	95.04	107.02	93.80	59.30	15.90
127	-9.62	24.62	68.58	98.98	106.42	89.33	56.58	67.79	98.63	107.75	91.61	54.94	11.81
128	-11.62	21.69	65.38	97.58	107.50	93.02	65.07	73.68	101.47	107.98	89.46	51.42	11.04

TIME	BETA	EARTH SPACE												END
Days	ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	END
129	-13.21	19.57	62.82	96.40	108.28	95.95	72.27	78.55	103.70	108.09	87.69	48.64	10.91	46.94
130	-14.31	18.09	61.05	95.58	108.82	97.98	77.26	81.91	105.24	108.16	86.46	46.72	10.83	46.80
131	-14.92	17.28	60.07	95.13	109.12	99.11	80.04	83.79	106.09	108.20	85.78	45.65	10.78	46.73
132	-15.03	17.13	59.89	95.05	109.17	99.31	80.53	84.12	106.25	108.21	85.66	45.47	10.77	46.71
133	-14.64	17.65	60.52	95.34	108.98	98.59	78.76	82.92	105.70	108.19	86.09	46.15	10.80	46.76
134	-13.76	18.82	61.93	95.99	108.55	96.97	74.79	80.24	104.47	108.13	87.07	47.68	10.87	46.87
135	-12.41	20.63	64.11	96.99	107.89	94.48	68.66	76.11	102.58	108.03	88.58	50.04	10.98	47.04
136	-10.65	23.00	66.95	98.31	107.02	91.22	60.64	70.70	100.10	107.91	90.55	53.12	11.12	47.26
137	-8.49	26.86	70.32	99.56	105.60	107.26	53.22	65.01	96.95	107.41	92.64	56.98	13.72	47.41
138	-6.01	31.81	74.16	100.82	103.78	82.70	45.82	58.90	93.26	106.66	94.89	61.46	17.92	47.52
139	-3.23	37.33	78.46	102.23	101.75	77.61	37.54	52.07	89.12	105.82	97.40	66.48	22.61	47.64
140	-0.24	43.29	83.09	103.76	99.56	72.11	28.63	44.70	84.67	104.91	100.11	71.88	27.67	47.78
141	2.95	51.00	87.86	104.78	96.77	66.41	22.97	38.18	79.68	103.29	102.46	77.74	36.91	47.66
142	6.25	59.09	92.79	105.79	93.85	60.51	17.44	31.53	74.49	101.56	104.85	83.82	46.80	47.51
143	9.63	67.37	97.83	106.83	90.86	54.49	11.79	24.73	69.19	99.78	107.29	90.03	56.92	47.36
144	13.02	77.48	102.58	107.13	87.20	48.60	10.93	19.91	63.71	97.32	109.06	96.31	71.71	46.98
145	16.37	87.74	107.25	107.35	83.49	42.78	10.66	15.37	58.26	94.80	110.72	102.54	86.95	46.58
146	19.61	97.63	111.76	107.55	79.91	37.17	10.40	11.00	53.00	92.36	112.33	108.55	101.64	46.19
147	22.70	110.24	115.86	107.14	76.04	32.14	10.07	10.17	47.89	89.42	113.30	114.42	115.36	45.64
148	25.55	122.27	119.61	106.68	72.42	27.55	9.76	9.86	43.17	86.63	114.11	119.84	127.96	126.74
149	28.11	133.05	122.97	106.27	69.17	23.44	9.48	9.58	38.94	84.13	114.85	124.70	139.24	131.75
150	30.28	142.20	125.83	105.85	66.36	20.04	9.23	9.33	35.36	81.95	115.43	128.93	148.83	142.22
151	32.02	149.41	128.14	105.19	63.88	17.88	8.99	9.09	32.58	79.92	115.67	132.87	156.41	129.73
152	33.25	154.53	129.77	104.72	62.12	16.35	8.82	8.92	30.60	78.49	115.85	135.66	161.78	149.95
153	33.89	157.16	130.61	104.48	61.21	15.56	8.73	8.84	29.58	77.75	115.94	137.09	164.55	143.43
154	33.97	157.52	130.73	104.44	61.09	15.45	8.72	8.83	29.45	77.65	115.95	137.29	164.92	143.41
155	33.54	155.72	130.15	104.61	61.71	15.99	8.78	8.89	30.14	78.15	115.89	136.31	163.03	143.51
156	32.49	151.37	128.76	105.01	63.20	17.30	8.93	9.03	31.82	79.37	115.74	133.93	158.46	143.57
157	30.90	144.77	126.65	105.62	65.48	19.27	9.15	9.25	34.37	81.23	115.52	130.33	151.52	143.43
158	28.77	135.85	123.84	106.16	68.32	22.37	9.41	9.51	37.84	83.48	115.04	125.96	142.18	144.51
159	26.21	125.06	120.48	106.57	71.58	26.49	9.69	9.79	42.08	85.99	114.30	121.10	130.88	144.98
160	23.25	112.54	116.58	107.05	75.35	31.26	10.01	10.11	46.99	88.89	113.45	115.46	117.77	143.73
161	19.98	98.77	112.28	107.58	79.50	36.52	10.37	10.49	52.40	92.08	112.51	109.25	103.33	146.14
162	16.43	87.90	107.33	107.35	83.43	42.69	10.66	15.30	58.17	94.76	110.75	102.64	87.19	146.57
163	12.69	76.50	102.13	107.11	87.56	49.16	10.95	20.35	64.23	97.56	108.90	95.71	70.25	147.02
164	8.78	65.29	96.57	106.57	91.62	56.00	13.21	26.44	70.52	100.23	106.68	88.47	54.38	147.39
165	4.81	55.56	90.64	105.35	95.13	63.09	19.86	34.43	76.76	102.31	103.81	81.17	42.49	147.57
166	0.76	45.64	84.60	104.11	98.70	70.31	26.63	42.57	83.11	104.44	100.88	73.72	30.37	147.76
167	-3.25	37.29	78.43	102.22	101.76	77.64	37.60	52.11	89.15	105.83	97.38	66.44	22.58	147.64
168	-7.24	29.35	72.25	100.19	104.68	84.97	49.50	61.94	95.10	107.04	93.77	59.23	15.83	147.46
169	-11.11	22.37	66.20	97.96	107.25	92.08	62.76	72.12	100.76	107.95	90.03	52.31	11.08	147.20
170	-14.86	17.36	60.17	95.17	109.09	98.99	79.76	83.60	106.01	108.20	85.85	45.76	10.78	146.73
171	-18.36	12.67	54.52	92.56	110.81	105.46	95.67	94.33	110.92	108.44	81.93	39.64	10.50	146.30

TIME Days	BETA ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH SPACE END
172	-21.62	10.29	49.22	89.78	112.10	111.57	110.30	106.21	115.36	108.28	78.03	34.12	10.19	45.77
173	-24.54	9.97	44.44	86.97	112.96	117.11	123.21	118.51	119.21	107.79	74.30	29.37	9.87	45.18
174	-27.09	9.69	40.26	84.51	113.72	121.96	134.51	129.29	122.58	107.36	71.03	25.21	9.59	44.67
175	-29.17	9.46	36.86	82.50	114.33	125.91	143.70	138.06	125.32	107.01	68.38	21.82	9.36	44.26
176	-30.75	9.27	34.30	80.83	114.67	129.17	150.65	144.67	127.42	106.58	66.24	19.53	9.17	43.93
177	-31.77	9.13	32.66	79.62	114.81	131.48	155.12	148.94	128.79	106.19	64.76	18.24	9.03	43.71
178	-32.21	9.07	31.97	79.11	114.86	132.46	157.02	150.74	129.38	106.02	64.13	17.70	8.97	43.62
179	-32.15	9.08	32.06	79.19	114.85	132.32	156.75	150.48	129.29	106.05	64.22	17.78	8.97	43.63
180	-31.47	9.17	33.14	79.98	114.77	130.80	153.80	147.68	128.39	106.31	65.19	18.62	9.07	43.78
181	-30.25	9.34	35.09	81.41	114.61	128.06	148.48	142.61	126.75	106.77	66.95	20.15	9.24	44.04
182	-28.53	9.53	37.90	83.12	114.14	124.71	140.89	135.37	124.48	107.12	69.19	22.86	9.43	44.38
183	-26.36	9.77	41.45	85.21	113.50	120.59	131.30	126.23	121.62	107.48	71.96	26.39	9.67	44.82
184	-23.84	10.05	45.58	87.64	112.76	115.76	120.13	115.58	118.29	107.90	75.19	30.50	9.95	45.32
185	-21.00	10.36	50.24	90.37	111.92	110.39	107.55	103.59	114.54	108.38	78.82	35.14	10.26	45.89
186	-17.95	13.21	55.18	92.87	110.61	104.71	93.82	93.08	110.35	108.41	82.39	40.35	10.53	46.35
187	-14.71	17.56	60.41	95.28	109.02	98.72	79.08	83.14	105.80	108.19	86.01	46.02	10.79	46.75
188	-11.38	22.01	65.77	97.76	107.38	92.57	63.97	72.94	101.13	107.96	89.73	51.84	11.06	47.17
189	-7.99	27.87	71.11	99.82	105.23	86.33	51.71	63.76	96.20	107.26	93.09	57.89	14.58	47.43
190	-4.63	34.56	76.30	101.52	102.77	80.17	41.70	55.50	91.20	106.24	96.14	63.96	20.25	47.58
191	-1.32	41.15	81.42	103.21	100.34	74.09	31.84	47.35	86.27	105.24	99.14	69.94	25.85	47.73
192	1.85	48.29	86.22	104.45	97.75	68.38	24.82	40.39	81.41	103.87	101.67	75.72	33.61	47.71
193	4.85	55.65	90.70	105.36	95.09	63.02	19.79	34.35	76.69	102.29	103.84	81.24	42.60	47.57
194	7.60	62.40	94.80	106.21	92.66	58.11	15.18	28.81	72.37	100.85	105.83	86.30	50.84	47.45
195	10.09	68.54	98.50	106.95	90.44	53.68	11.16	23.87	68.47	99.52	107.60	90.87	58.42	47.33
196	12.21	75.02	101.46	107.08	88.10	50.00	10.99	21.00	65.02	97.93	108.66	94.81	68.05	47.07
197	13.96	80.36	103.89	107.19	86.16	46.97	10.85	18.64	62.18	96.61	109.52	98.06	75.98	46.87
198	15.25	84.32	105.69	107.28	84.73	44.72	10.75	16.89	60.08	95.64	110.17	100.47	81.87	46.71
199	16.09	86.87	106.85	107.33	83.81	43.28	10.68	15.76	58.72	95.01	110.58	102.01	85.65	46.61
200	16.42	87.88	107.32	107.35	83.44	42.70	10.66	15.31	58.19	94.76	110.74	102.63	87.16	46.57
201	16.24	87.32	107.06	107.34	83.64	43.02	10.67	15.56	58.48	94.90	110.65	102.29	86.33	46.59
202	15.54	85.21	106.10	107.29	84.41	44.22	10.73	16.49	59.61	95.42	110.31	101.01	83.18	46.71
203	14.36	81.58	104.44	107.22	85.72	46.28	10.82	18.10	61.54	96.31	109.72	98.80	77.79	46.82
204	12.69	76.49	102.12	107.11	87.57	49.17	10.95	20.35	64.24	97.57	108.89	95.70	70.23	47.02
205	10.58	70.05	99.19	106.98	89.90	52.82	11.12	23.20	67.66	99.15	107.85	91.79	60.67	47.27
206	8.08	63.56	95.51	106.35	92.24	57.26	14.39	27.86	71.63	100.60	106.17	87.17	52.26	47.43
207	5.22	56.55	91.25	105.48	94.77	62.36	19.18	33.61	76.12	102.10	104.10	81.92	43.70	47.56
208	2.06	48.81	86.53	104.51	97.56	68.00	24.47	39.97	81.08	103.76	101.82	76.10	34.24	47.70
209	-1.37	41.03	81.33	103.18	100.39	74.19	32.00	47.49	86.36	105.26	99.09	69.84	25.76	47.73
210	-5.00	33.82	75.73	101.34	103.04	80.85	42.81	56.41	91.75	106.35	95.80	63.29	19.63	47.57
211	-8.80	26.25	69.85	99.40	105.82	87.83	54.13	65.77	97.41	107.51	92.36	56.42	13.20	47.39
212	-12.70	20.24	63.63	96.77	108.03	95.02	69.99	77.01	102.99	108.05	88.25	49.52	10.95	47.00
213	-16.69	14.91	57.22	93.81	109.99	102.37	88.07	89.21	108.57	108.32	83.80	42.56	10.64	46.50
214	-20.71	10.39	50.72	90.66	111.83	109.84	106.26	102.35	114.16	108.43	79.19	35.61	10.29	45.95

TIME	BETA Days	ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH SPACE END
215	-24.54	9.97	44.44	86.97	112.96	117.12	123.21	118.52	119.21	107.79	74.30	29.37	9.87	45.18	124.88
216	-28.09	9.58	38.62	83.54	114.02	123.87	138.95	133.53	123.90	107.19	69.75	23.57	9.48	44.47	121.28
217	-31.86	9.12	32.52	79.52	114.82	131.67	155.50	149.29	128.91	106.16	64.63	18.13	9.01	43.70	116.78
218	-35.40	8.63	26.88	75.38	115.27	139.61	170.90	163.95	133.64	104.80	59.55	13.71	8.53	42.95	111.90
219	-38.68	8.18	21.64	71.53	115.68	146.99	185.21	177.58	138.04	103.54	54.82	9.61	8.07	42.25	107.37
220	-41.56	7.74	17.83	67.86	115.90	155.41	198.04	189.80	142.88	102.22	50.42	7.72	7.63	41.74	102.86
221	-44.00	7.34	15.15	64.55	115.97	163.95	209.10	200.35	147.68	100.93	46.50	7.33	7.24	41.37	98.65
222	-45.86	7.04	13.12	62.03	116.03	170.45	217.52	208.37	151.33	99.95	43.52	7.04	6.93	40.87	92.79
223	-47.09	6.84	11.77	60.36	116.07	174.75	223.09	213.68	153.75	99.30	41.55	6.85	6.73	40.91	93.32
224	-47.60	6.75	11.21	59.66	116.08	176.54	225.42	215.90	154.76	99.03	40.72	6.77	6.65	40.84	92.44
225	-47.40	6.79	11.43	59.94	116.08	175.83	224.50	215.02	154.36	99.14	41.05	6.80	6.68	40.87	92.79
226	-46.47	6.94	12.44	61.19	116.05	172.59	220.30	211.02	152.54	99.63	42.53	6.95	6.83	41.00	95.44
227	-44.89	7.20	14.18	63.35	116.00	167.05	213.11	204.17	149.42	100.46	45.08	7.19	7.09	41.24	97.12
228	-42.76	7.55	16.52	66.24	115.93	159.59	203.45	194.96	145.23	101.59	48.50	7.53	7.44	41.56	100.80
229	-40.14	7.98	19.39	69.80	115.85	150.42	191.57	183.64	140.07	102.97	52.71	7.94	7.87	41.95	105.32
230	-37.16	8.39	24.07	73.31	115.49	143.57	178.58	171.27	136.00	104.13	57.01	11.51	8.28	42.57	109.47
231	-33.89	8.84	29.28	77.14	115.07	136.24	164.35	157.72	131.63	105.38	61.71	15.59	8.73	43.26	113.97
232	-30.46	9.31	34.76	81.17	114.64	128.53	149.39	143.47	127.03	106.70	66.65	19.89	9.21	43.99	118.71
233	-26.88	9.71	40.60	84.71	113.66	121.57	133.59	128.41	122.30	107.39	71.30	25.55	9.61	44.71	122.51
234	-23.27	10.11	46.52	88.19	112.59	114.70	117.59	113.15	117.53	108.00	75.92	31.44	10.01	45.44	126.17
235	-19.65	10.94	52.45	91.60	111.45	107.84	101.52	98.28	112.73	108.53	80.49	37.38	10.40	46.13	129.71
236	-16.11	15.68	58.14	94.24	109.71	101.31	85.47	87.45	107.77	108.29	84.44	43.57	10.68	46.58	131.91
237	-12.66	20.30	63.70	96.81	108.01	94.94	69.80	76.88	102.93	108.05	88.30	49.60	10.96	47.01	134.05
238	-9.40	25.06	68.92	99.10	106.26	88.93	55.92	67.24	98.31	107.69	91.81	55.33	12.19	47.37	135.84
239	-6.33	31.16	73.66	100.66	104.01	83.30	46.78	59.69	93.74	106.76	94.59	60.88	17.37	47.51	136.48
240	-3.54	36.72	77.98	102.08	101.97	78.17	38.46	52.82	89.58	105.91	97.12	65.92	22.09	47.63	137.06
241	-1.04	41.71	81.86	103.35	100.14	73.57	31.00	46.66	85.85	105.15	99.39	70.45	26.33	47.74	137.58
242	1.11	46.48	85.11	104.22	98.40	69.70	26.06	41.88	82.57	104.26	101.13	74.35	31.39	47.74	137.57
243	2.88	50.82	87.75	104.76	96.84	66.54	23.10	38.32	79.79	103.33	102.41	77.61	36.69	47.66	137.20
244	4.23	54.13	89.77	105.17	95.64	64.13	20.83	35.61	77.67	102.62	103.39	80.09	40.74	47.60	136.92
245	5.12	56.30	91.09	105.45	94.86	62.54	19.35	33.82	76.28	102.15	104.03	81.73	43.40	47.56	136.73
246	5.53	57.31	91.71	105.57	94.49	61.81	18.66	32.99	75.63	101.94	104.33	82.49	44.63	47.54	136.64
247	5.53	57.32	91.71	105.57	94.49	61.80	18.65	32.98	75.63	101.94	104.33	82.49	44.64	47.54	136.64
248	5.06	56.17	91.01	105.43	94.91	62.64	19.44	33.93	76.37	102.18	103.99	81.63	43.23	47.56	136.74
249	4.11	53.84	89.59	105.14	95.75	64.34	21.03	35.84	77.86	102.68	103.30	79.88	40.38	47.61	136.94
250	2.71	50.42	87.51	104.71	96.98	66.83	23.37	38.65	80.05	103.42	102.29	77.31	36.21	47.67	137.23
251	0.88	45.93	84.77	104.15	98.60	70.10	26.44	42.34	82.93	104.38	100.97	73.94	30.71	47.75	137.62
252	-1.32	41.15	81.42	103.21	100.34	74.09	31.84	47.35	86.27	105.24	99.14	69.94	25.85	47.73	137.52
253	-3.89	36.02	77.44	101.90	102.23	78.81	39.51	53.69	90.10	106.02	96.80	65.29	21.50	47.61	136.99
254	-6.75	30.33	73.02	100.44	104.32	84.06	48.03	60.72	94.36	106.89	94.21	60.12	16.66	47.49	136.39
255	-9.91	24.04	68.13	98.84	106.63	89.87	57.44	68.50	99.07	107.84	91.35	54.41	11.32	47.34	135.73
256	-13.26	19.50	62.74	96.36	108.30	96.05	72.51	78.70	103.77	108.09	87.63	48.55	10.91	46.93	133.68
257	-16.82	14.73	57.00	93.71	110.06	102.62	88.68	89.62	108.76	108.33	83.65	42.33	10.62	46.49	131.47

TIME Days	BETA ANGLE	EARTH SPACE												
		ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	END END
258	-20.48	10.42	51.10	90.88	111.76	109.40	105.23	101.37	13.85	108.47	79.49	35.99	10.32	45.99
259	-24.26	10.00	44.90	87.24	112.88	116.58	121.97	117.33	118.84	107.83	74.66	29.83	9.90	45.24
260	-28.03	9.59	38.73	83.60	114.00	123.75	138.66	133.24	123.81	107.20	69.84	23.68	9.49	44.48
261	-31.77	9.13	32.66	79.62	114.81	131.48	155.12	148.94	128.79	106.19	64.76	18.24	9.03	43.71
262	-35.46	8.62	26.78	75.30	115.27	139.76	171.18	164.23	133.73	104.78	59.45	13.63	8.52	42.93
263	-38.97	8.14	21.18	71.20	115.72	147.63	186.45	178.77	138.42	103.43	54.41	9.25	8.03	42.19
264	-42.26	7.63	17.06	66.92	115.92	157.85	201.20	192.81	144.25	101.85	49.30	7.61	7.52	41.63
265	-45.19	7.15	13.85	62.94	116.01	168.11	214.49	205.48	150.02	100.30	44.59	7.15	7.04	41.20
266	-47.70	6.74	11.09	59.52	116.09	176.90	225.89	216.35	154.96	98.98	40.55	6.75	6.63	40.82
267	-49.63	6.42	8.98	56.90	116.15	183.65	234.63	224.68	158.75	97.96	37.46	6.45	6.32	40.53
268	-50.93	6.21	7.56	55.14	116.19	188.19	240.51	230.28	161.30	97.28	35.38	6.25	6.11	40.34
269	-51.46	6.12	6.98	54.42	116.20	190.05	242.93	232.58	162.35	97.00	34.52	6.17	6.02	40.26
270	-51.21	6.16	7.24	54.75	116.20	189.20	241.83	231.53	161.87	97.12	34.91	6.20	6.06	40.30
271	-50.21	6.32	8.34	56.11	116.16	185.69	237.27	227.20	159.90	97.65	36.52	6.36	6.22	40.45
272	-48.49	6.61	10.23	58.45	116.11	179.66	229.47	219.75	156.51	98.56	39.29	6.63	6.50	40.70
273	-46.18	6.99	12.76	61.59	116.04	171.58	218.98	209.77	151.97	99.78	43.00	6.99	6.88	41.05
274	-43.34	7.45	15.88	65.45	115.95	161.63	206.09	197.48	146.37	101.28	47.56	7.44	7.34	41.47
275	-40.14	7.98	19.39	69.80	115.85	150.42	191.57	183.64	140.07	102.97	52.71	7.94	7.87	41.95
276	-36.63	8.46	24.91	73.93	115.42	142.39	176.28	169.08	135.30	104.33	57.77	12.17	8.35	42.68
277	-33.19	8.93	30.40	77.96	114.99	134.66	161.29	154.81	130.69	105.65	62.72	16.47	8.83	43.41
278	-29.45	9.43	36.40	82.23	114.42	126.45	144.95	139.25	125.69	106.96	68.02	21.36	9.33	44.20
279	-25.51	9.86	42.85	86.03	113.25	118.96	127.51	122.62	120.49	107.62	73.05	27.79	9.76	44.99
280	-21.61	10.29	49.25	89.79	112.10	111.54	110.23	106.14	115.34	108.28	78.05	34.15	10.19	45.77
281	-17.72	13.53	55.56	93.04	110.50	104.27	92.75	92.36	110.02	108.39	82.65	40.76	10.55	46.38
282	-13.93	18.60	61.67	95.87	108.63	97.28	75.54	80.75	104.70	108.14	86.88	47.39	10.86	46.85
283	-10.26	23.52	67.58	98.60	106.83	90.50	58.88	69.51	99.56	107.89	90.98	53.80	11.15	47.31
284	-6.79	30.25	72.95	100.42	104.35	84.14	48.15	60.83	94.42	106.90	94.18	60.04	16.59	47.48
285	-3.53	36.74	78.00	102.08	101.96	78.15	38.43	52.80	89.57	105.91	97.13	65.94	22.11	47.63
286	-0.55	42.67	82.61	103.60	99.78	72.68	29.55	45.47	85.13	105.01	99.83	71.32	27.15	47.77
287	2.12	48.96	86.62	104.53	97.51	67.89	24.36	39.85	80.98	103.73	101.86	76.22	34.43	47.69
288	4.42	54.61	90.06	105.23	95.47	63.78	20.51	35.21	77.37	102.52	103.53	80.45	41.32	47.59
289	6.34	59.29	92.91	105.82	93.78	60.37	17.30	31.36	74.36	101.51	104.91	83.97	47.05	47.50
290	7.81	62.91	95.11	106.27	92.48	57.74	14.83	28.39	72.05	100.74	105.98	86.68	51.47	47.44
291	8.82	65.39	96.63	106.58	91.58	55.93	13.14	26.35	70.46	100.21	106.71	88.55	54.50	47.39
292	9.36	66.71	97.43	106.74	91.10	54.97	12.24	25.27	69.61	99.93	107.10	89.54	56.11	47.37
293	9.41	66.82	97.50	106.76	91.06	54.89	12.16	25.18	69.54	99.90	107.13	89.62	56.25	47.37
294	8.96	65.72	96.83	106.62	91.46	55.69	12.91	26.08	70.24	100.14	106.81	88.80	54.90	47.39
295	8.03	63.45	95.44	106.34	92.28	57.34	14.46	27.95	71.70	100.62	106.14	87.09	52.13	47.43
296	6.67	60.10	93.41	105.92	93.49	59.78	16.75	30.70	73.84	101.34	105.15	84.58	48.04	47.49
297	4.87	55.69	90.72	105.37	95.08	62.99	19.77	34.32	76.67	102.29	103.85	81.27	42.65	47.57
298	2.71	50.40	87.50	104.71	96.99	66.84	23.38	38.66	80.06	103.42	102.29	77.30	36.18	47.67
299	0.19	44.23	83.74	103.94	99.21	71.33	27.59	43.73	84.01	104.74	100.47	72.67	28.65	47.78
300	-2.60	38.59	79.43	102.56	101.28	76.45	35.66	50.51	88.18	105.63	97.97	67.62	23.68	47.67

TIME Days	BETA ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH SPACE END
301	-5.65	32.52	74.72	101.00	103.52	82.04	44.75	58.01	92.72	106.55	93.21	62.11	18.53	47.54
302	-8.86	26.13	69.75	99.37	105.87	87.94	54.32	65.92	97.50	107.53	92.30	56.31	13.10	47.39
303	-12.24	20.86	64.38	97.12	107.80	94.17	67.89	75.59	102.34	108.02	88.77	50.33	10.99	47.06
304	-15.68	16.26	58.84	94.56	109.49	100.51	83.49	86.11	107.16	108.26	84.93	44.33	10.72	46.63
305	-19.17	11.58	53.21	91.96	111.21	106.96	99.36	96.83	112.06	108.49	81.02	38.22	10.44	46.19
306	-22.63	10.18	47.57	88.80	112.40	113.49	114.77	110.47	116.69	108.11	76.73	32.48	10.08	45.56
307	-25.74	9.84	42.47	85.80	113.32	119.41	128.55	123.61	120.80	107.59	72.75	27.40	9.74	44.94
308	-28.85	9.50	37.37	82.80	114.24	125.32	142.33	136.74	124.91	107.06	68.78	22.33	9.40	44.32
309	-31.88	9.11	32.49	79.50	114.82	131.71	155.58	149.37	128.93	106.15	64.61	18.11	9.01	43.69
310	-34.57	8.74	28.20	76.35	115.16	137.75	167.29	160.52	132.53	105.12	60.74	14.75	8.64	43.12
311	-36.88	8.43	24.51	73.64	115.45	142.94	177.36	170.11	135.63	104.23	57.41	11.86	8.32	42.63
312	-38.73	8.17	21.57	71.48	115.69	147.08	185.39	177.76	138.09	103.53	54.76	9.55	8.07	42.24
313	-40.03	8.00	19.51	69.95	115.85	150.04	191.07	183.17	139.86	103.02	52.88	7.96	7.89	41.97
314	-40.71	7.88	18.76	69.02	115.87	152.43	194.16	186.11	141.20	102.67	51.79	7.85	7.77	41.86
315	-40.75	7.88	18.71	68.97	115.87	152.58	194.36	186.30	141.28	102.64	51.72	7.84	7.77	41.86
316	-40.14	7.98	19.38	69.80	115.85	150.44	191.58	183.65	140.08	102.97	52.70	7.94	7.87	41.95
317	-38.88	8.15	21.33	71.31	115.71	147.42	186.05	178.38	138.30	103.47	54.55	9.36	8.05	42.21
318	-37.04	8.41	24.26	73.46	115.47	143.29	178.05	170.76	135.84	104.17	57.19	11.66	8.30	42.60
319	-34.66	8.73	28.06	76.24	115.17	137.96	167.69	160.90	132.65	105.09	60.61	14.64	8.63	43.10
320	-31.85	9.12	32.54	79.54	114.81	131.65	155.45	149.24	128.89	106.16	64.65	18.15	9.01	43.70
321	-28.64	9.52	37.72	83.01	114.18	124.92	141.39	135.85	124.63	107.10	69.05	22.67	9.42	44.36
322	-25.16	9.90	43.42	86.37	113.15	118.30	125.96	121.14	120.03	107.68	73.50	28.36	9.80	45.06
323	-21.43	10.31	49.53	89.96	112.04	111.21	109.47	105.41	115.11	108.31	78.27	34.43	10.21	45.80
324	-17.56	13.73	55.80	93.15	110.42	103.99	92.06	91.90	109.80	108.38	82.82	41.03	10.56	46.39
325	-13.56	19.09	62.25	96.14	108.45	96.60	73.88	79.63	104.19	108.11	87.29	48.02	10.89	46.89
326	-9.54	24.78	68.70	99.02	106.36	89.18	56.34	67.58	98.51	107.73	91.69	55.08	11.95	47.36
327	-5.48	32.86	74.98	101.09	103.39	81.73	44.24	57.60	92.47	106.50	95.36	62.42	18.81	47.54
328	-1.49	40.80	81.15	103.12	100.47	74.41	32.36	47.78	86.53	105.29	98.98	69.62	25.56	47.72
329	2.42	49.71	87.08	104.62	97.24	67.35	23.85	39.23	80.51	103.57	102.08	76.78	35.34	47.68
330	6.16	58.87	92.66	105.77	93.93	60.67	17.59	31.71	74.63	101.60	104.79	83.66	46.54	47.51
331	9.75	67.65	98.01	106.86	90.76	54.28	11.59	24.50	69.00	99.72	107.38	90.25	57.27	47.35
332	13.06	77.61	102.63	107.14	87.16	48.53	10.93	19.86	63.65	97.29	109.08	96.39	71.89	46.97
333	16.09	86.88	106.86	107.33	83.80	43.27	10.68	15.76	58.72	95.01	110.58	102.02	85.67	46.61
334	18.75	94.99	110.55	107.50	80.87	38.66	10.47	12.17	54.41	93.01	111.90	106.95	97.72	46.29
335	21.03	103.18	113.66	107.41	78.17	34.83	10.26	10.36	50.66	91.06	112.82	111.24	107.97	45.95
336	22.71	110.27	115.87	107.14	76.03	32.12	10.07	10.17	47.88	89.42	113.30	114.44	115.39	45.64
337	24.07	116.00	117.65	106.92	74.30	29.94	9.92	10.02	45.63	88.09	113.69	117.02	121.39	45.38
338	24.87	119.40	118.71	106.79	73.28	28.64	9.83	9.93	44.30	87.30	113.92	118.55	124.95	45.23
339	25.13	120.49	119.06	106.75	72.95	28.23	9.81	9.91	43.87	87.04	113.99	119.04	126.10	45.19
340	24.84	119.27	118.68	106.80	73.32	28.69	9.84	9.94	44.35	87.33	113.91	118.49	124.82	45.24
341	24.01	115.75	117.58	106.93	74.38	30.03	9.93	10.03	45.73	88.14	113.67	116.91	121.14	45.39
342	22.68	110.13	115.83	107.15	76.07	32.18	10.08	10.18	47.93	89.45	113.29	114.38	115.25	45.64
343	20.89	102.60	113.48	107.44	78.34	35.05	10.27	10.37	50.89	91.19	112.78	110.98	107.36	45.97

TIME	BETA ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	END EARTH SPACE
Days														
344	18.70	94.84	110.49	107.50	80.92	38.75	10.47	12.23	54.49	93.05	111.87	106.86	97.50	130.30
345	16.16	87.08	106.95	107.33	83.73	43.15	10.68	15.67	58.61	94.96	110.61	102.14	85.97	46.60
346	13.33	78.43	103.01	107.15	86.86	48.06	10.90	19.49	63.21	97.09	109.21	96.89	73.12	46.94
347	10.29	69.17	98.79	106.96	90.21	53.32	11.15	23.59	68.13	99.37	107.71	91.26	59.36	47.30
348	7.07	61.09	94.01	106.04	93.13	59.06	16.08	29.89	73.21	101.13	105.44	85.32	49.24	47.47
349	3.77	53.01	89.09	105.03	96.05	64.94	21.60	36.52	78.39	102.86	103.06	79.25	39.37	47.62
350	0.41	44.77	84.07	104.00	99.02	70.94	27.23	43.29	83.67	104.63	100.62	73.07	29.30	47.77
351	-2.92	37.96	78.94	102.39	101.52	77.03	36.61	51.30	88.66	105.72	97.68	67.04	23.14	47.66
352	-6.21	31.41	73.86	100.72	103.92	83.07	46.41	59.39	93.55	106.72	94.71	61.10	17.58	47.51
353	-9.34	25.18	69.01	99.13	106.22	88.81	55.74	67.09	98.21	107.67	91.87	55.45	12.29	47.37
354	-12.31	20.77	64.27	97.07	107.84	94.29	68.20	75.80	102.44	108.03	88.69	50.21	10.99	47.05
355	-15.02	17.14	59.90	95.05	109.17	99.30	80.50	84.10	106.24	108.21	85.66	45.48	10.77	46.71
356	-17.43	13.91	56.01	93.25	110.36	103.75	91.47	91.50	109.62	108.38	82.97	41.26	10.58	46.41
357	-19.47	11.17	52.73	91.73	111.36	107.52	100.73	97.75	112.48	108.51	80.69	37.69	10.41	46.16
358	-21.11	10.35	50.06	90.27	111.95	110.61	108.05	104.06	114.69	108.36	78.68	34.95	10.25	45.87
359	-22.27	10.22	48.16	89.15	112.29	112.81	113.18	108.95	116.22	108.17	77.20	33.07	10.12	45.64
360	-22.93	10.15	47.08	88.52	112.49	114.06	116.09	111.72	117.08	108.06	76.36	31.99	10.05	45.50
361	-23.06	10.13	46.87	88.39	112.53	114.31	116.67	112.28	117.26	108.04	76.19	31.78	10.03	45.48
362	-22.64	10.18	47.55	88.79	112.40	113.52	114.83	110.53	116.71	108.11	76.72	32.46	10.08	45.56
363	-21.69	10.28	49.11	89.71	112.12	111.71	110.61	106.50	115.45	108.27	77.94	34.01	10.18	45.75
364	-20.25	10.44	51.48	91.10	111.69	108.96	104.21	100.40	113.54	108.51	79.79	36.37	10.34	46.04
365	-18.29	12.76	54.63	92.61	110.78	105.34	95.36	94.12	110.82	108.43	82.01	39.76	10.51	46.30
366	-15.97	15.86	58.37	94.34	109.64	101.06	84.83	87.02	107.57	108.28	84.60	43.81	10.69	46.59
367	-13.40	19.31	62.52	96.26	108.37	96.30	73.14	79.13	103.96	108.10	87.47	48.31	10.90	46.92
368	-10.32	23.44	67.48	98.55	106.86	90.61	59.15	69.69	99.64	107.89	100.92	53.70	11.14	47.30
369	-6.98	29.88	72.66	100.33	104.49	84.48	48.70	61.28	94.70	106.95	94.01	59.71	16.28	47.48
370	-3.38	37.04	78.23	102.16	101.85	77.88	37.98	52.43	89.34	105.86	97.27	66.21	22.36	47.64
371	0.36	44.65	84.00	103.99	99.06	71.03	27.31	43.39	83.74	104.65	100.59	72.98	29.16	47.77
372	4.27	54.24	89.83	105.19	95.60	64.05	20.76	35.51	77.60	102.60	103.42	80.18	40.87	47.60
373	8.24	63.96	95.76	106.40	92.09	56.97	14.11	27.53	71.37	100.51	106.29	87.48	52.76	47.42
374	12.28	75.24	101.56	107.09	88.02	49.87	10.99	20.91	64.90	97.87	108.69	94.95	68.38	47.07
375	16.27	87.42	107.11	107.34	83.61	42.96	10.67	15.51	58.43	94.88	110.67	102.35	86.48	46.59
376	20.23	99.81	112.61	107.54	79.18	36.11	10.34	10.44	51.98	91.84	112.59	109.73	104.45	46.10
377	24.05	115.90	117.62	106.92	74.33	29.98	9.92	10.02	45.67	88.11	113.68	116.97	121.29	45.39
378	27.72	131.41	122.46	106.33	69.66	24.06	9.52	9.62	39.59	84.51	114.74	123.96	137.53	44.70
379	31.12	145.68	126.94	105.53	65.16	19.00	9.12	9.22	34.02	80.98	115.55	130.83	152.48	44.04
380	34.24	158.63	131.08	104.34	60.70	15.12	8.68	8.79	29.02	77.33	115.99	137.90	166.09	43.35
381	36.94	169.83	134.66	103.31	56.85	11.77	8.31	8.42	24.70	74.18	116.37	144.00	177.85	42.76
382	39.18	179.14	137.64	102.45	53.65	8.98	8.00	8.11	21.10	71.56	116.68	149.08	187.64	42.27
383	40.87	186.27	140.43	101.69	51.10	7.82	7.75	7.86	18.82	69.40	116.79	153.92	195.11	41.93
384	41.95	190.94	142.57	101.13	49.39	7.65	7.57	7.68	17.61	67.89	116.79	157.65	199.98	41.74
385	42.38	192.77	143.41	100.91	48.72	7.58	7.50	7.61	17.14	67.30	116.78	159.11	201.88	41.66
386	42.14	191.74	142.94	101.03	49.09	7.62	7.54	7.65	17.41	67.64	116.78	158.29	200.82	41.70

TIME Days	BETA ANGLE	ROW 1	ROW 2	ROW 3	ROW 4	ROW 5	ROW 6	ROW 7	ROW 8	ROW 9	ROW 10	ROW 11	ROW 12	EARTH END	SPACE END
387	41.26	187.95	141.20	101.49	50.49	7.76	7.68	7.79	18.39	68.86	116.79	155.26	196.86	41.86	103.38
388	39.76	181.54	138.40	102.23	52.82	8.26	7.92	8.03	20.17	70.89	116.77	150.39	190.15	42.14	105.89
389	37.75	173.21	135.74	103.00	55.69	10.75	8.20	8.31	23.39	73.23	116.48	145.85	181.41	42.58	108.65
390	35.28	162.97	132.47	103.94	59.21	13.82	8.54	8.65	27.34	76.11	116.14	140.26	170.65	43.12	112.06
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

APPENDIX C

CHARTS *BEGINNING OF MISSION TEMPERATURES*

This page intentionally left blank

APPENDIX C
INDEX
BEGINNING OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	PAGE
A1	A0175	Gr/Polyemide & Gr/Epoxy Composites Structure Boundary	1, 91, 271 163, 164, 175, 176	C - 1 C - 87
A2	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	2, 92 164, 165, 176, 177	C - 7 C - 91
A3	A0187-	Chemistry of Micrometeoroids Structure Boundary	3, 93 165, 166, 177, 178	C - 13 C - 95
A4	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	4, 94 166, 167, 178, 179	C - 19 C - 99
A5	S0001	Space Debris Impact Structure Boundary	5, 95 167, 168, 179, 180	C - 25 C - 103
A6	S0001	Space Debris Impact Structure Boundary	6, 96 168, 169, 180, 181	C - 31 C - 107
A7	A0175	Gr/Polyemide & Gr/Epoxy Composites Structure Boundary	7, 97, 272 169, 170, 181, 182	C - 37 C - 111
A8	A0171	Solar Array Materials (Passive) Structure Boundary	8, 98 170, 171, 182, 183	C - 43 C - 115
A9	S0069	Thermal Control Surfaces Structure Boundary	9, 99 171, 172, 183, 184	C - 49 C - 119
A10	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	10, 100 172, 173, 184, 185	C - 55 C - 123
A11	A0187-	Chemistry of Micrometeoroids Structure Boundary	11, 101 173, 174, 185, 186	C - 61 C - 127
A12	S0001	Space Debris Impact Structure Boundary	12, 102 163, 174, 175, 186	C - 67 C - 131
B1	S0001	Space Debris Impact Structure Boundary	13, 103 163, 164	C - 2 C - 88
B2	S0001	Space Debris Impact Structure Boundary	14, 104 164, 165	C - 8 C - 92
B3	A0138	//\FRECOPA//\ Structure Boundary	15, 105, 273 165, 166	C - 14 C - 96
B4	A0054	Space Plasma High Voltage Drainage Structure Boundary	16, 106 166, 167	C - 20 C - 100
B5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	17, 107 167, 168	C - 26 C - 104
B6	S0001	Space Debris Impact Structure Boundary	18, 108 168, 169	C - 32 C - 108
B7	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	19, 109 169, 170	C - 38 C - 112
B8	A0056 A0147 S0001	High-Perf IR Multilayer Filters & Material Exposure of ERBE Components Space Debris Impact Structure Boundary	20, 110 170, 171	C - 44 C - 116
B9	A0134 S0010	Composites for Large Space Structures Spacecraft Coatings Structure Boundary	21, 111 171, 172	C - 50 C - 120
B10	S1005	Transverse Flat Heat Pipe Structure Boundary	22, 112 172, 173	C - 56 C - 124
B11	S0001	Space Debris Impact Structure Boundary	23, 113 173, 174	C - 62 C - 128
B12	A0201	Interplanetary Dust Structure Boundary	24, 114 163, 174	C - 68 C - 132
C1		---GRAPPLE---	25, 115, 274 163, 164, 221	C - 3 C - 88, 151
C2	A0015 A0187- M0006	Free Flyer Biostack Isotopic Micrometeoroid Measurement Space Environment Effects Structure Boundary	26, 116, 276 164, 165, 222	C - 9 C - 92, 151
C3	A0023	Multiple Foil Microabrasion Package	27, 117	C - 15

APPENDIX C
INDEX
BEGINNING OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	PAGE
C3	A0034	Atomic Oxygen Stimulated Outgassing		
	A0114	Atomic Oxygen / Solid Surfaces Interaction		
	A0201	Interplanetary Dust Structure Boundary	165, 166, 223	C - 96, 151
C4	S0001	Space Debris Impact Structure Boundary	28, 118 166, 167, 224	C - 21 C - 100, 152
C5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	29, 119 167, 168, 225	C - 27 C - 104, 152
C6	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	30, 120 168, 169, 226	C - 33 C - 108, 152
C7	S0001	Space Debris Impact Structure Boundary	31, 121 169, 170, 227	C - 39 C - 112, 153
C8	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	32, 122 170, 171, 228	C - 45 C - 116, 153
C9	A0023 A0034 A0114 A0201	Multiple Foil Microabrasion Package Atomic Oxygen Stimulated Outgassing Atomic Oxygen / Solid Surfaces Interaction Interplanetary Dust Structure Boundary	33, 123 171, 172, 229	C - 51 C - 120, 153
C10		---GRAPPLE---	34, 124, 275 172, 173, 230	C - 57 C - 124, 154
C11	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	35, 125 173, 174, 231	C - 63 C - 128, 154
C12	S0109	Fiber Optic Data Transmission Structure Boundary	36, 126 163, 174, 232	C - 69 C - 132, 154
D1	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	37, 127 221, 240, 241	C - 4 C - 151, 89
D2	A0172 A0189 S0001	Effects of Solar Radiation on Glasses Quartz Crystal Oscillators Space Debris Impact Structure Boundary	38, 128, 277, 278 222, 241, 242	C - 10 C - 151, 93
D3	M0002- M0003	Trapped Proton Energy Spectrum Spacecraft Materials Structure Boundary	39, 129 223, 242, 243	C - 16 C - 151, 97
D4	M0003	Spacecraft Materials Structure Boundary	40, 130 224, 243, 244	C - 22 C - 152, 101
D5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	41, 131 225, 244, 245	C - 28 C - 152, 105
D6	A0201 S0001 A0201	Interplanetary Dust Space Debris Impact Structure Boundary	42, 132, 279 226, 245, 246	C - 34 C - 152, 109
D7	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	43, 133 227, 246, 247	C - 40 C - 153, 113
D8	M0003	Spacecraft Materials Structure Boundary	44, 134 228, 247, 248	C - 46 C - 153, 117
D9	M0002- M0003	Trapped Proton Energy Spectrum Spacecraft Materials Structure Boundary	45, 135 229, 248, 249	C - 52 C - 153, 121
D10	A0054	Space Plasma High Voltage Drainage Structure Boundary	46, 136 230, 249, 250	C - 58 C - 154, 125
D11	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	47, 137 231, 250, 251	C - 64 C - 154, 129
D12	A0019 A0023 A0180	High Toughness G/E Composites Multiple Foil Microabrasion Package Polymer Matrix Composites Structure Boundary	48, 138, 280, 281 232, 240, 251	C - 70 C - 154, 133
E1	S0001	Space Debris Impact Structure Boundary	49, 139 240, 241	C - 5 C - 89

APPENDIX C
INDEX
BEGINNING OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	PAGE
E2	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	50, 140 241, 242	C - 11 C - 93
E3	S1002	Coatings & Solar Cells from Germany Structure Boundary	51, 141 242, 243	C - 17 C - 97
E4	S0001	Space Debris Impact Structure Boundary	52, 142 243, 244	C - 23 C - 101
E5	A0044 A0135 S0050	Holographic Data Storage Crystals Pyroelectric Infrared Detectors Active Optical System Components Structure Boundary	53, 143 244, 245	C - 29 C - 105
E6	A0023 M0002- S1003 S1006	Multiple Foil Microabrasion Package Heavy Cosmic Ray Nuclei Ion-Beam-Textured Surfaces Balloon Materials Structure Boundary	54, 144 245, 246	C - 35 C - 109
E7	S0001	Space Debris Impact Structure Boundary	55, 145 246, 247	C - 41 C - 113
E8	A0187-	Isotopic Micrometeoroid Measurement Structure Boundary	56, 146 247, 248	C - 47 C - 117
E9	S0014	Advanced Photovoltaics Structure Boundary	57, 147 248, 249	C - 53 C - 121
E10	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	58, 148 249, 250	C - 59 C - 125
E11	S0001	Space Debris Impact Structure Boundary	59, 149 250, 251	C - 65 C - 129
E12	A0038	Interstellar Gas Experiment Structure Boundary	60, 150 240, 251	C - 71 C - 133
F1	S0001	Space Debris Impact Structure Boundary	61, 151 187, 188, 240, 241	C - 6 C - 90
F2	P0004 P0006	Seeds in Space Linear Energy Transfer Spectrum Structure Boundary	62, 152 188, 189, 241, 242	C - 12 C - 94
F3	S0001	Space Debris Impact Structure Boundary	63, 153 189, 190, 242, 243	C - 18 C - 98
F4	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	64, 154 190, 191, 243, 244	C - 24 C - 102
F5	S0001	Space Debris Impact Structure Boundary	65, 155 191, 192, 244, 245	C - 30 C - 106
F6	A0038	Interstellar Gas Experiment Structure Boundary	66, 156 192, 193, 245, 246	C - 36 C - 110
F7	S0001	Space Debris Impact Structure Boundary	67, 157 193, 194, 246, 247	C - 42 C - 114
F8	M0004	Fiber Optics Systems Structure Boundary	68, 158 194, 195, 247, 248	C - 48 C - 118
F9	A0076	Cascade Variable Conductance Heat Pipe Structure Boundary	69, 159 195, 196, 248, 249	C - 54 C - 122
F10	S0001	Space Debris Impact Structure Boundary	70, 160 196, 197, 249, 250	C - 60 C - 126
F11	S0001	Space Debris Impact Structure Boundary	71, 161 197, 198, 250, 251	C - 66 C - 130
F12	S1001	Low Temperature Heat Pipe (HEPP) Structure Boundary	72, 162 187, 198, 240, 251	C - 72 C - 134
G2	A0015	Free Flyer Biostack Structure Boundary	81, 252 200	C - 81 C - 143
G4	S0001	Space Debris Impact Structure Boundary	75, 255 201	C - 82 C - 144
G6	A0139a	Growth of Crystals from Solutions Structure Boundary	74, 254 199, 201, 202	C - 83 C - 145

APPENDIX C
INDEX
BEGINNING OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	PAGE
G8	S0001	Space Debris Impact Structure Boundary	73, 253 202	C - 84 C - 146
G10	A0201	Interplanetary Dust Structure Boundary	79, 259 203	C - 85 C - 147
G12	A0056	High-Perf IR Multilayer Filters & Material	80, 260, 283, 284	C - 86
	A0147	Exposure of ERBE Components		
	A0172	Effects of Solar Radiation on Glasses		
	M0002-	Trapped Proton Energy Spectrum Structure Boundary	199, 200, 203	C - 148
H1	S1001	Low Temperature Heat Pipe (HEPP) Structure Boundary	90, 261 209	C - 73 C - 135
H3	M0001	Heavy Ions in Space Structure Boundary	88, 268 208, 209, 210	C - 74 C - 136
H5	S0001	Space Debris Impact Structure Boundary	85, 265 210	C - 75 C - 137
H6	A0038	Interstellar Gas Experiment Structure Boundary	84, 264 208, 210, 211	C - 76 C - 138
H7	A0133	Radar Phased-Array Antenna Structure Boundary	83, 263, 282 211	C - 77 C - 139
H9	A0038	Interstellar Gas Experiment Structure Boundary	86, 266 208, 211, 212	C - 78 C - 140
H11	A0023 A0201	Multiple Foil Microabrasion Package Interplanetary Dust Structure Boundary	82, 262 212	C - 79 C - 141
H12	M0001	Heavy Ions in Space Structure Boundary	89, 269 208, 209, 212	C - 80 C - 142
CENTER STRUCTURE INTERIOR			217, 218, 219, 220	C - 149
DUMMY NODE & Ctr. AVERAGE (217-220)			233, 217-220	C - 150
CENTER RING ROWS 1 - 3			221, 222, 223	C - 151
CENTER RING ROWS 4 - 6			224, 225, 226	C - 152
CENTER RING ROWS 7 - 9			227, 228, 229	C - 153
CENTER RING ROWS 1- 12			230, 231, 232	C - 154
INITIATE SYSTEM & P0003 ELECTRONICS			237	C - 155
EARTH END THERMAL PANELS			204, 205, 206, 207	C - 156
SPACE END THERMAL PANELS			213, 214, 215, 216	C - 157
EARTH END THERMAL PANEL SIDE ROWS 2 - 4			295, 296, 297	C - 158
EARTH END THERMAL PANEL SIDE ROWS 5 - 7			298, 299, 300	C - 159
EARTH END THERMAL PANEL SIDE ROWS 8 - 10			301, 302, 303	C - 160
EARTH END THERMAL PANEL SIDE ROWS 1, 11, 12			294, 304, 305	C - 161
SPACE END THERMAL PANEL SIDE ROWS 2 - 4			307, 308, 309	C - 162
SPACE END THERMAL PANEL SIDE ROWS 5 - 7			310, 311, 312	C - 163
SPACE END THERMAL PANEL SIDE ROWS 8 - 10			313, 314, 315	C - 164
SPACE END THERMAL PANEL SIDE ROWS 1, 11, 12			306, 316, 317	C - 165
EARTH DUMMY COVER PLATES			256, 257, 258	C - 166
SPACE DUMMY COVER PLATES			267	C - 167
MAGNETIC DAMPER & SHROUD			234, 235	C - 168
AO139-A BATTERY CLUSTER			236	C - 169
MAIN SCUFF PLATES			285, 286	C - 170
MAIN TRUNNION PINS			238, 239	C - 171
END SCUFF PLATES			289, 292	C - 172
END TRUNNION PINS			290, 293	C - 173
END SUPPORT BEAM			287, 288, 291	C - 174
KELL PIN			270	C - 175
AVERAGE FOR TRAYS 1- 72			1 - 72	C - 176
THERMOCOUPLE NODE AT E END & LONG 6-7			326, 327	C - 177
INTERIOR STRUTS			318, 319	C - 178

**APPENDIX C
INDEX
BEGINNING OF MISSION**

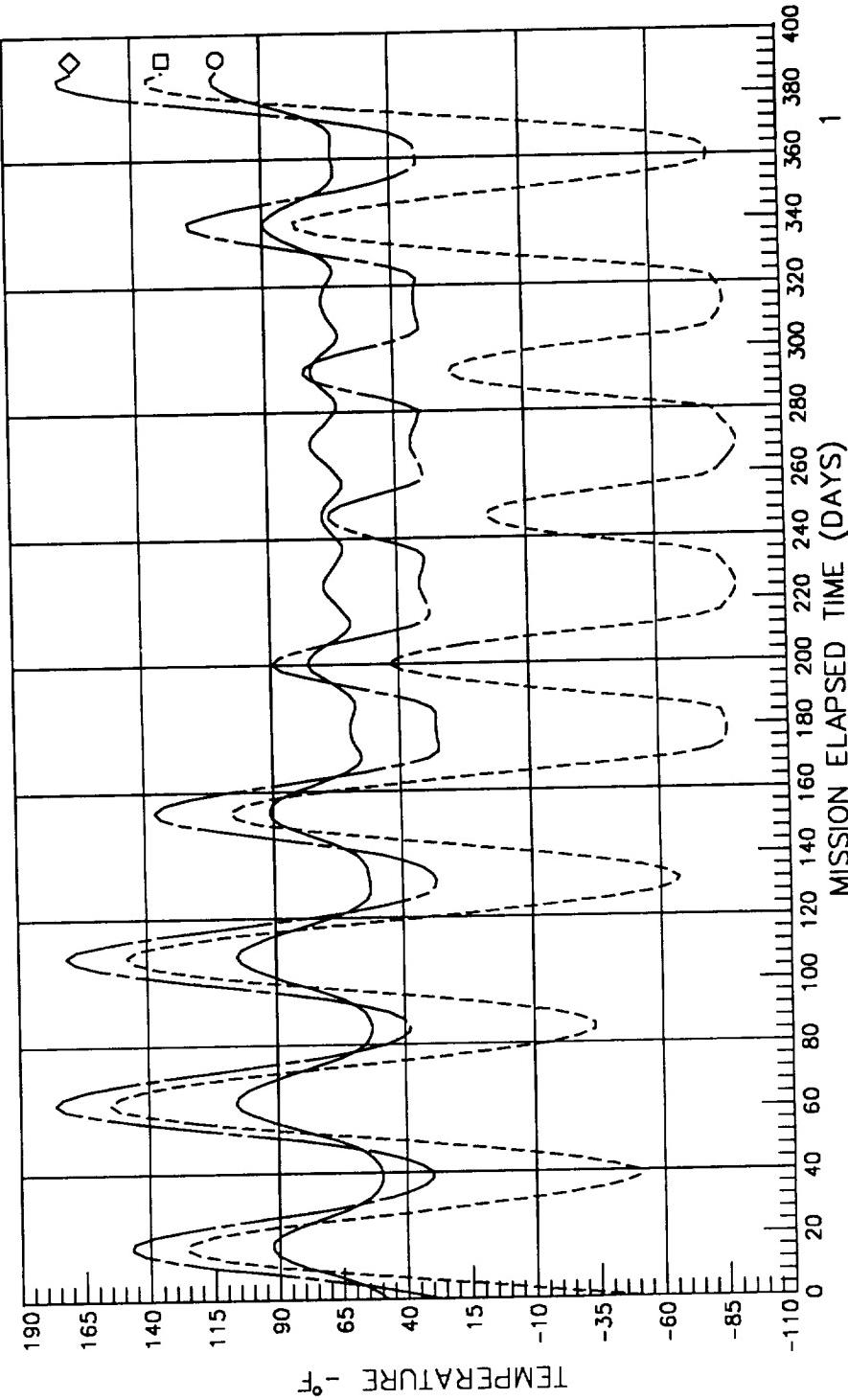
LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	PAGE
INTERIOR STRUTS			320,321	C -179
INTERIOR STRUTS			322,323	C -180
INTERIOR STRUTS			324,325	C -181

This page intentionally left blank

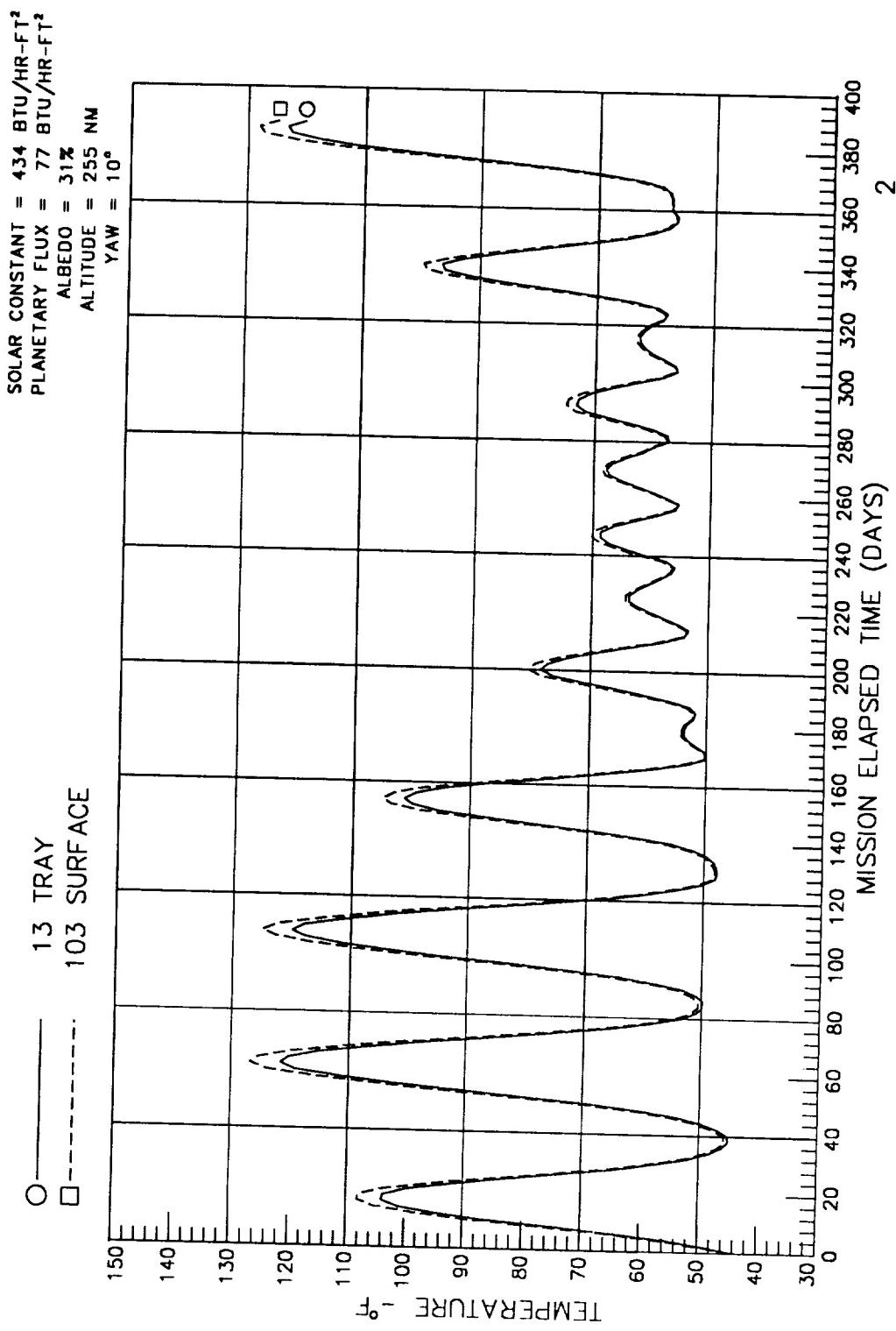
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A1

—○— 1 TRAY
 -□--- 91 SURFACE
 -○--- 271 SURFACE

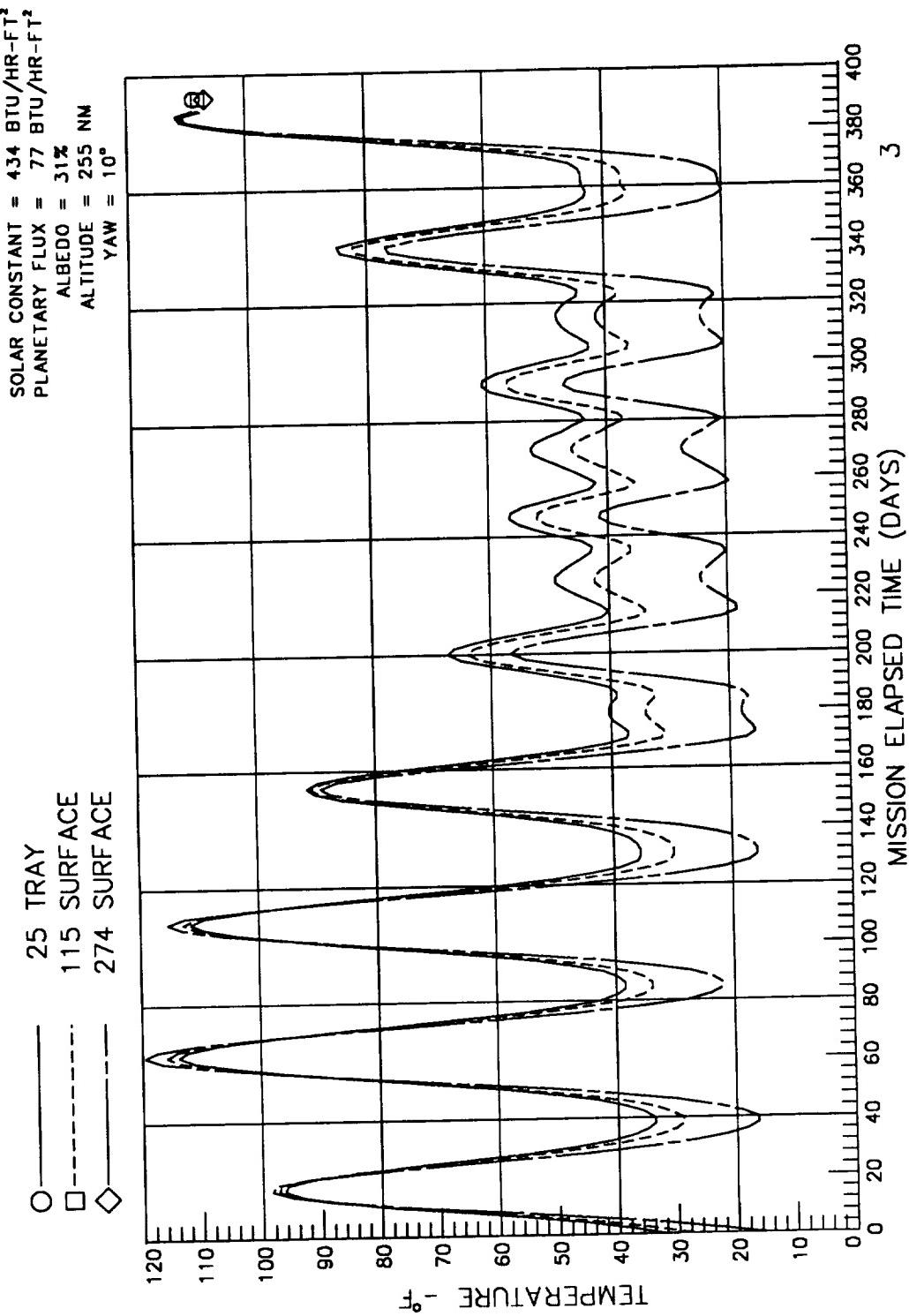
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



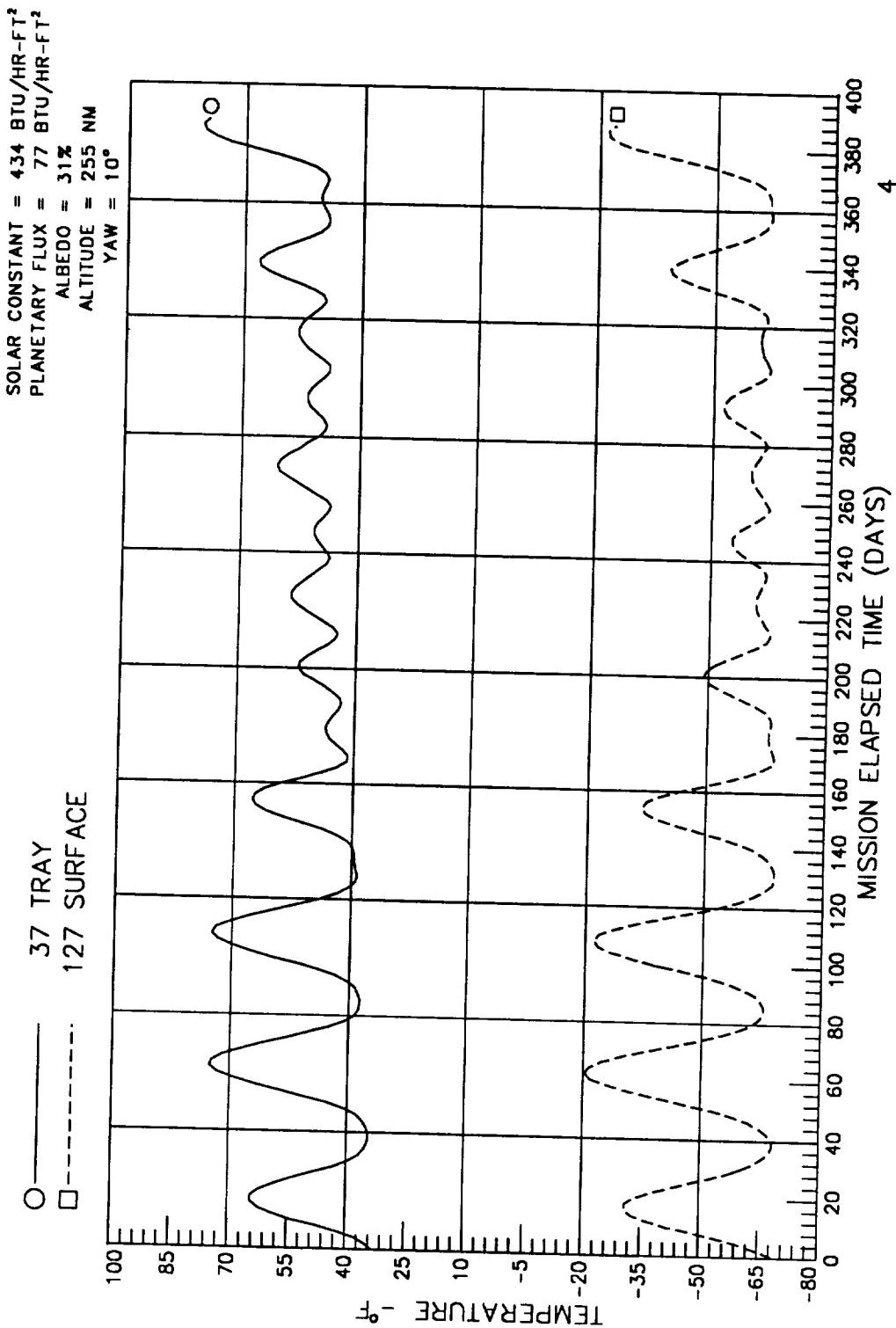
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B1



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C1



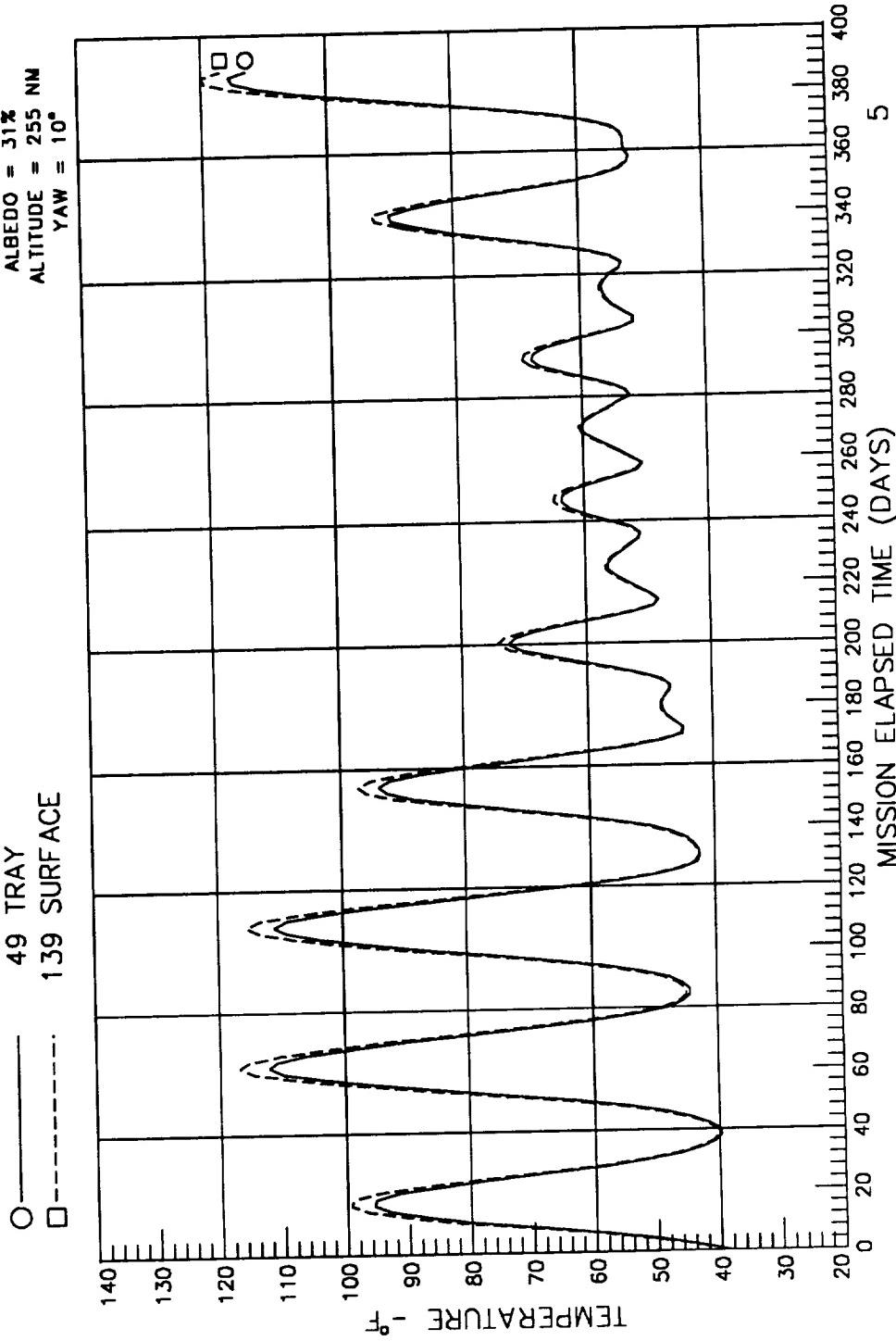
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D1



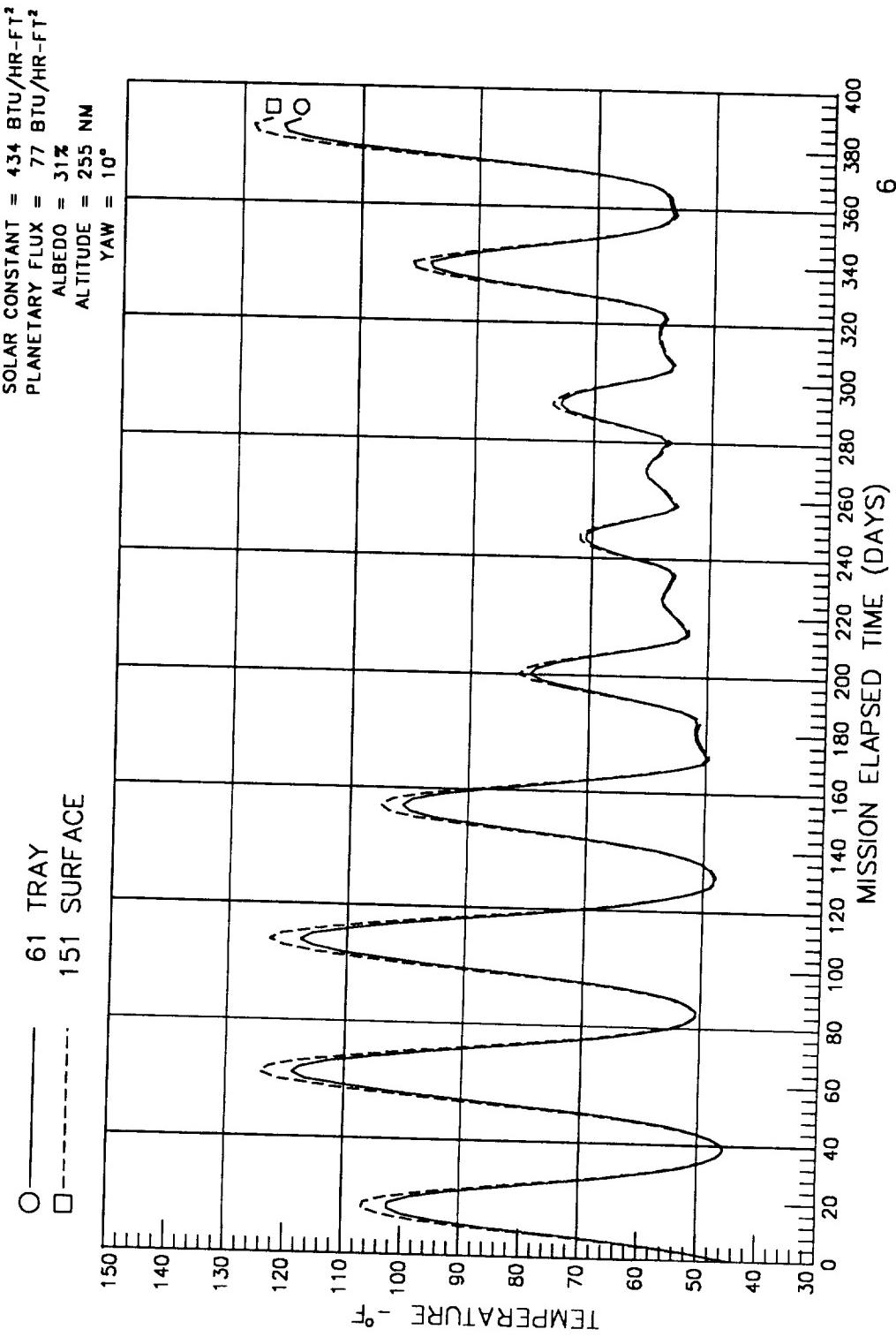
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E1

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

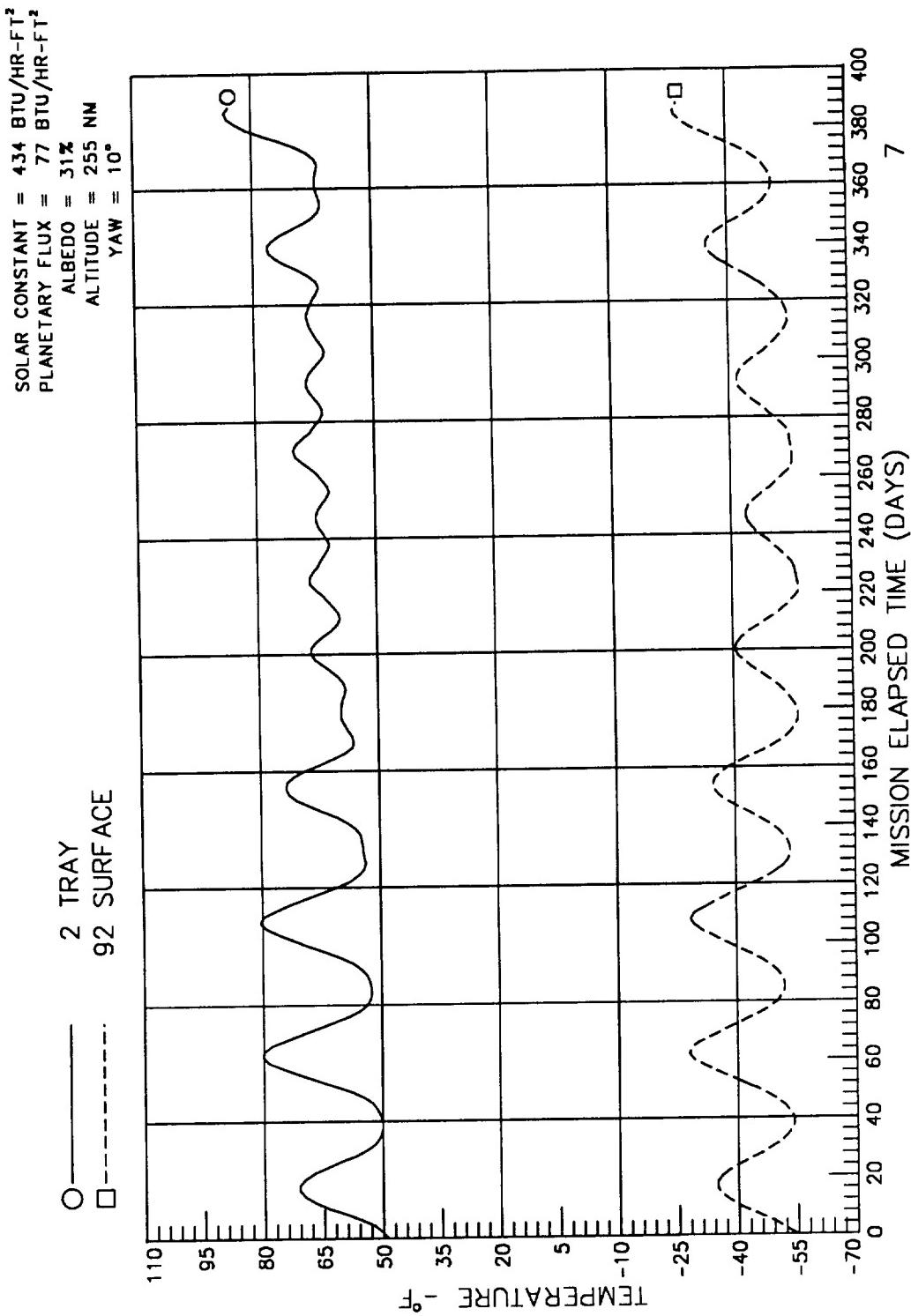
ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



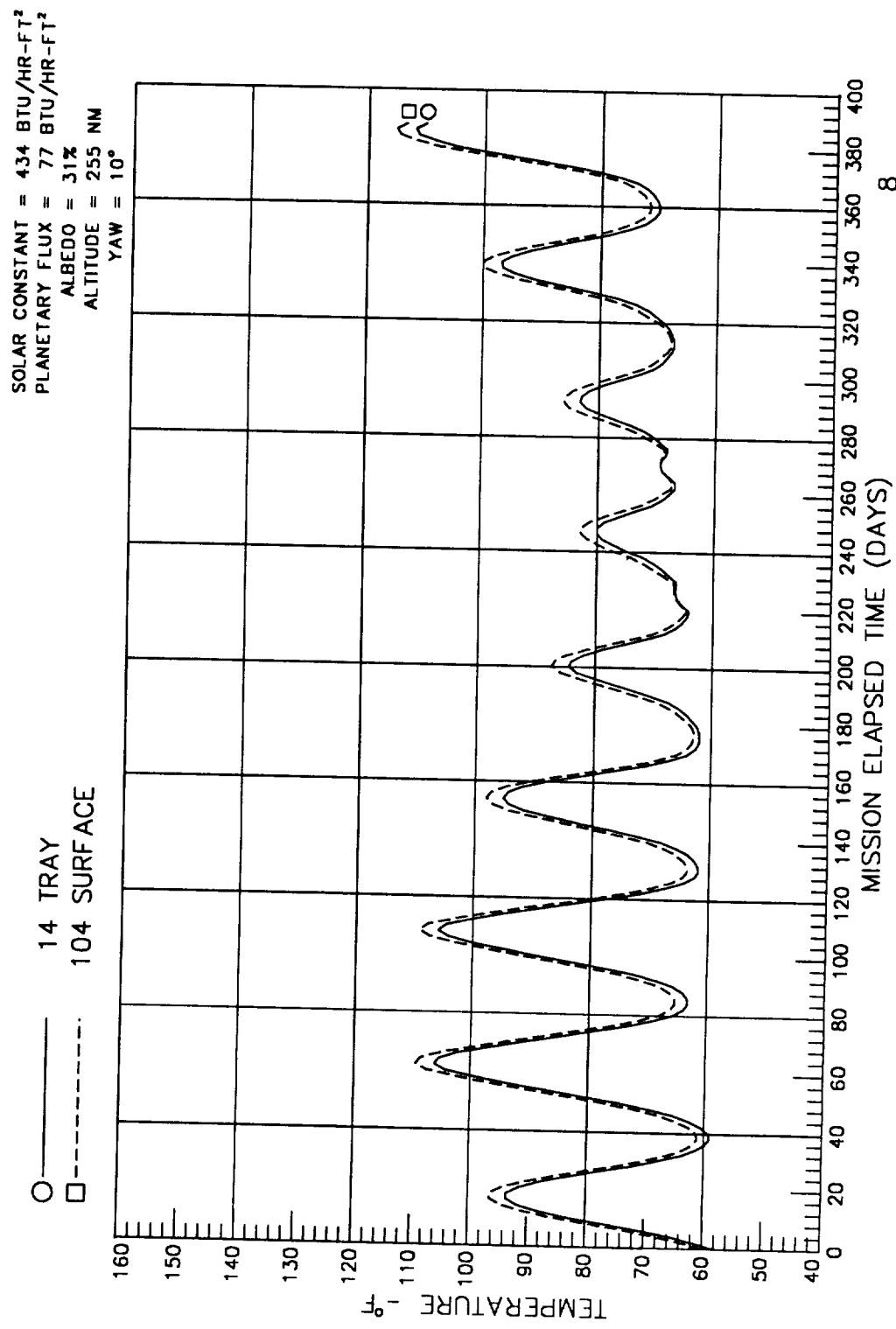
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F1



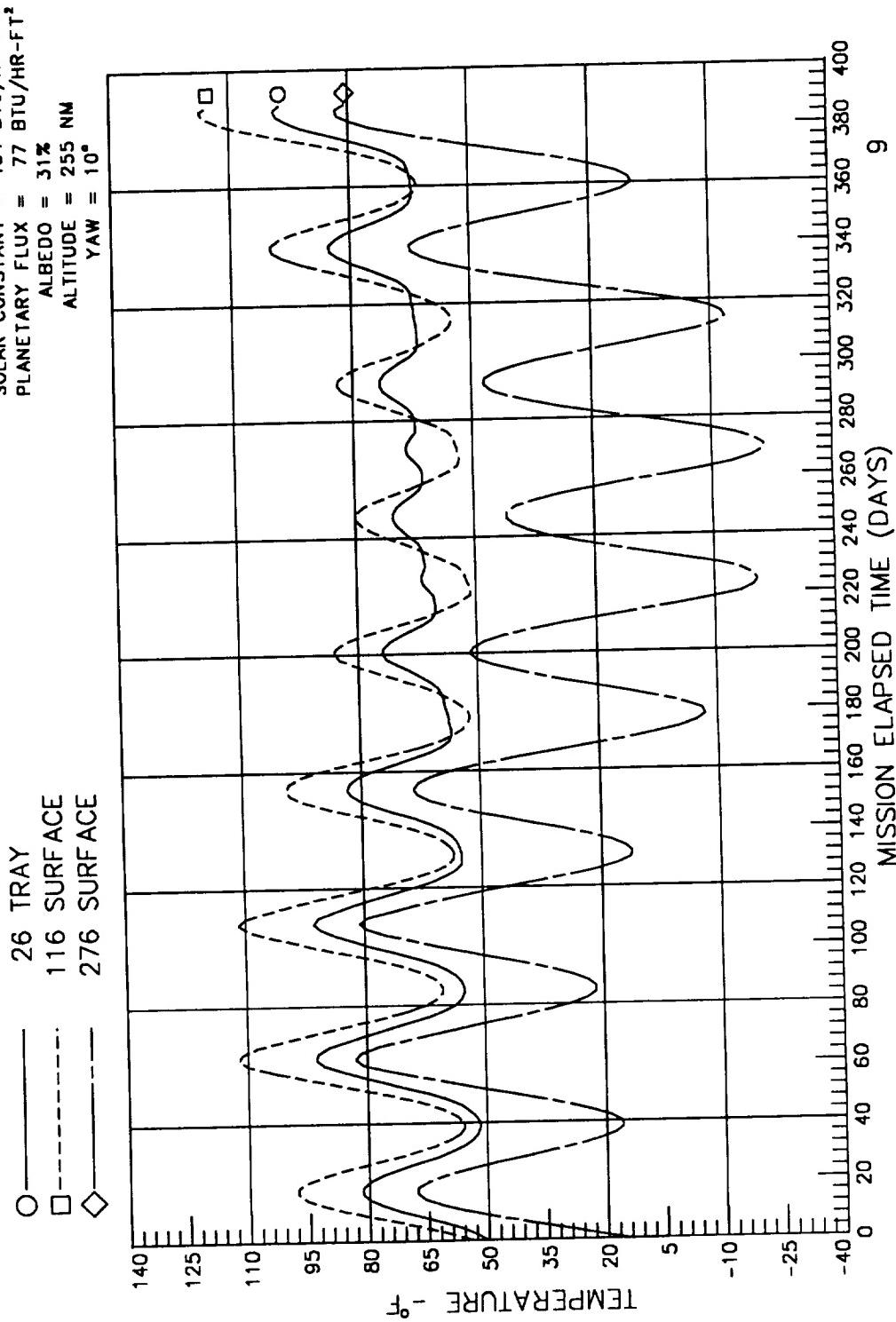
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A2



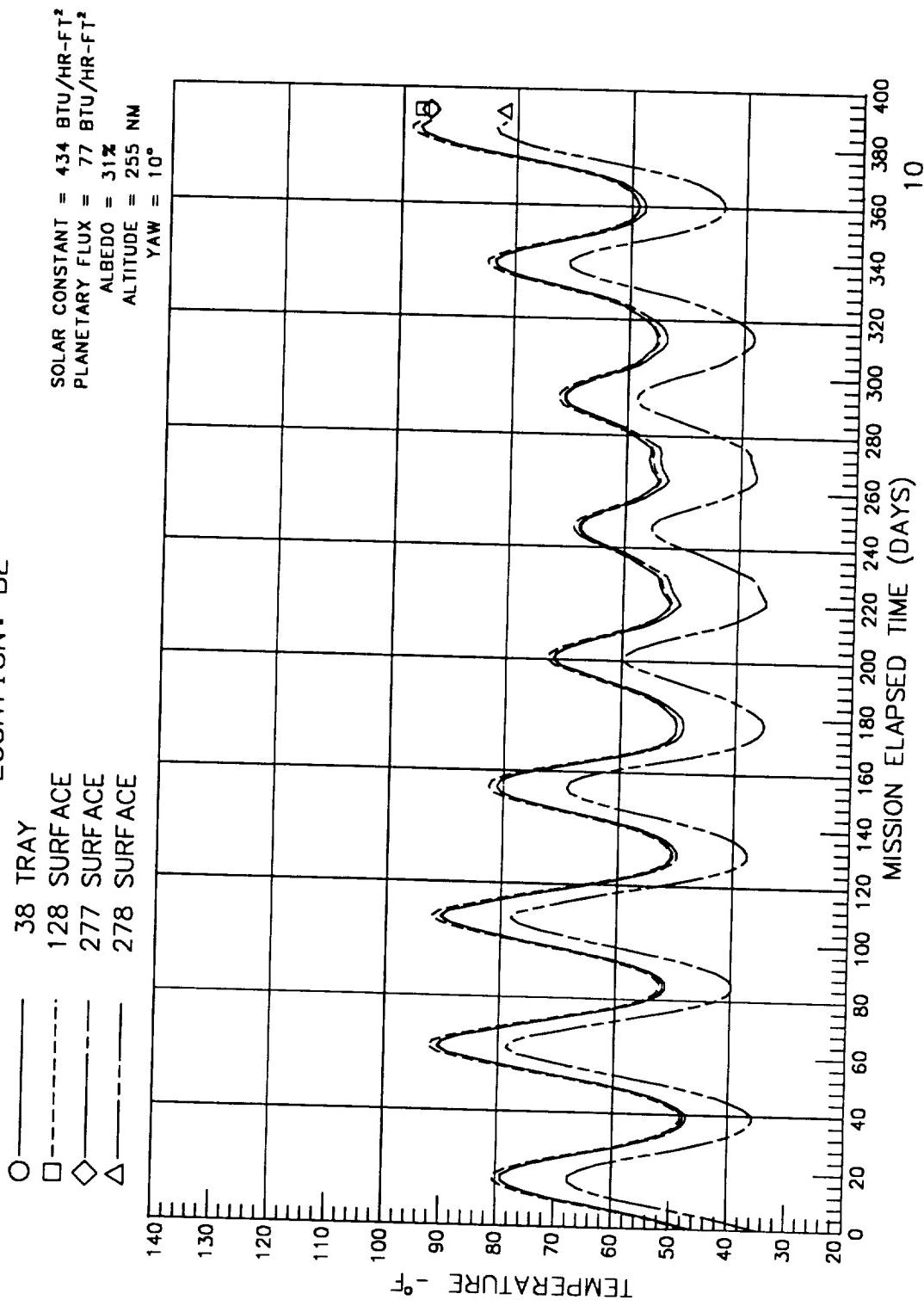
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B2



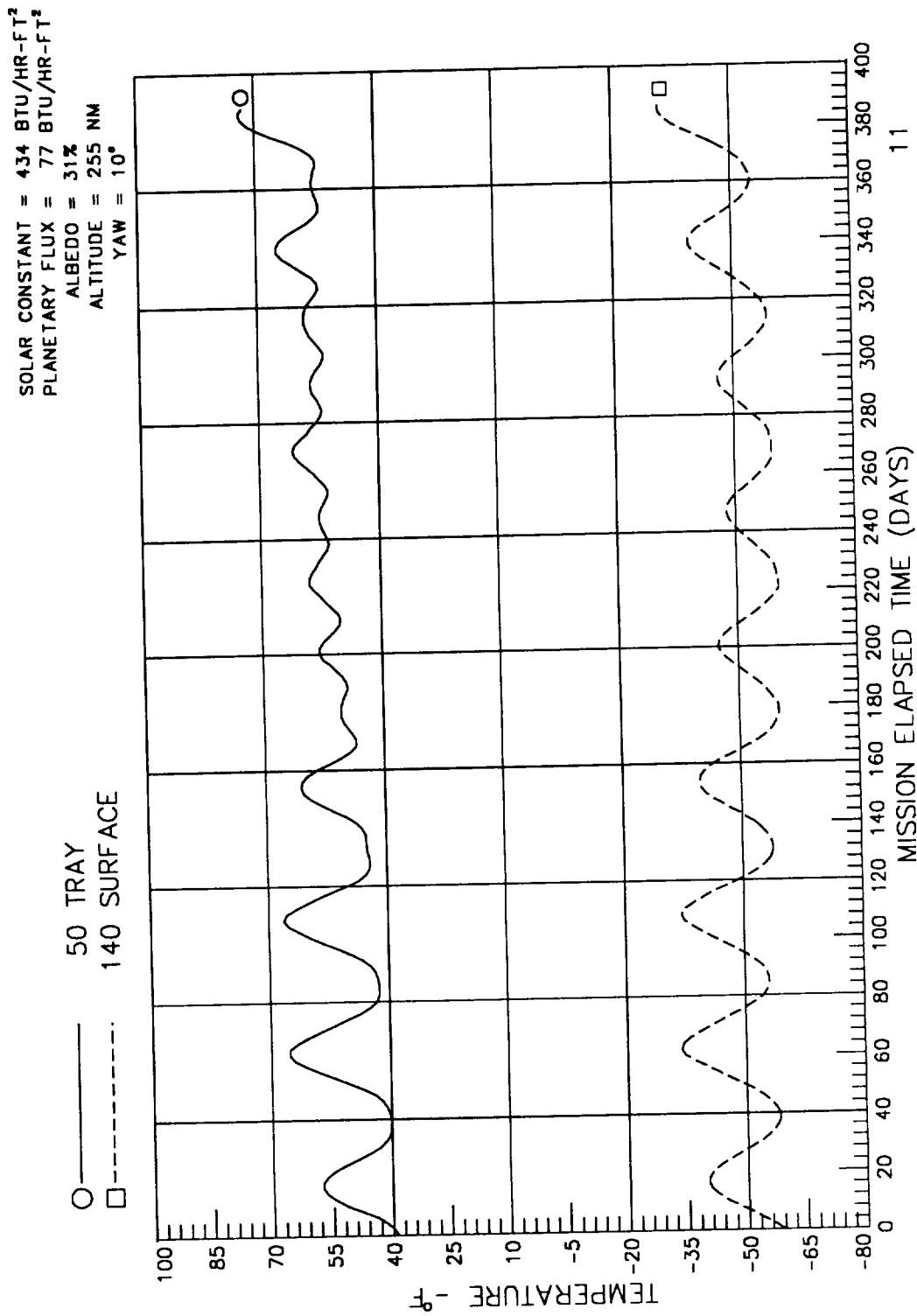
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C2



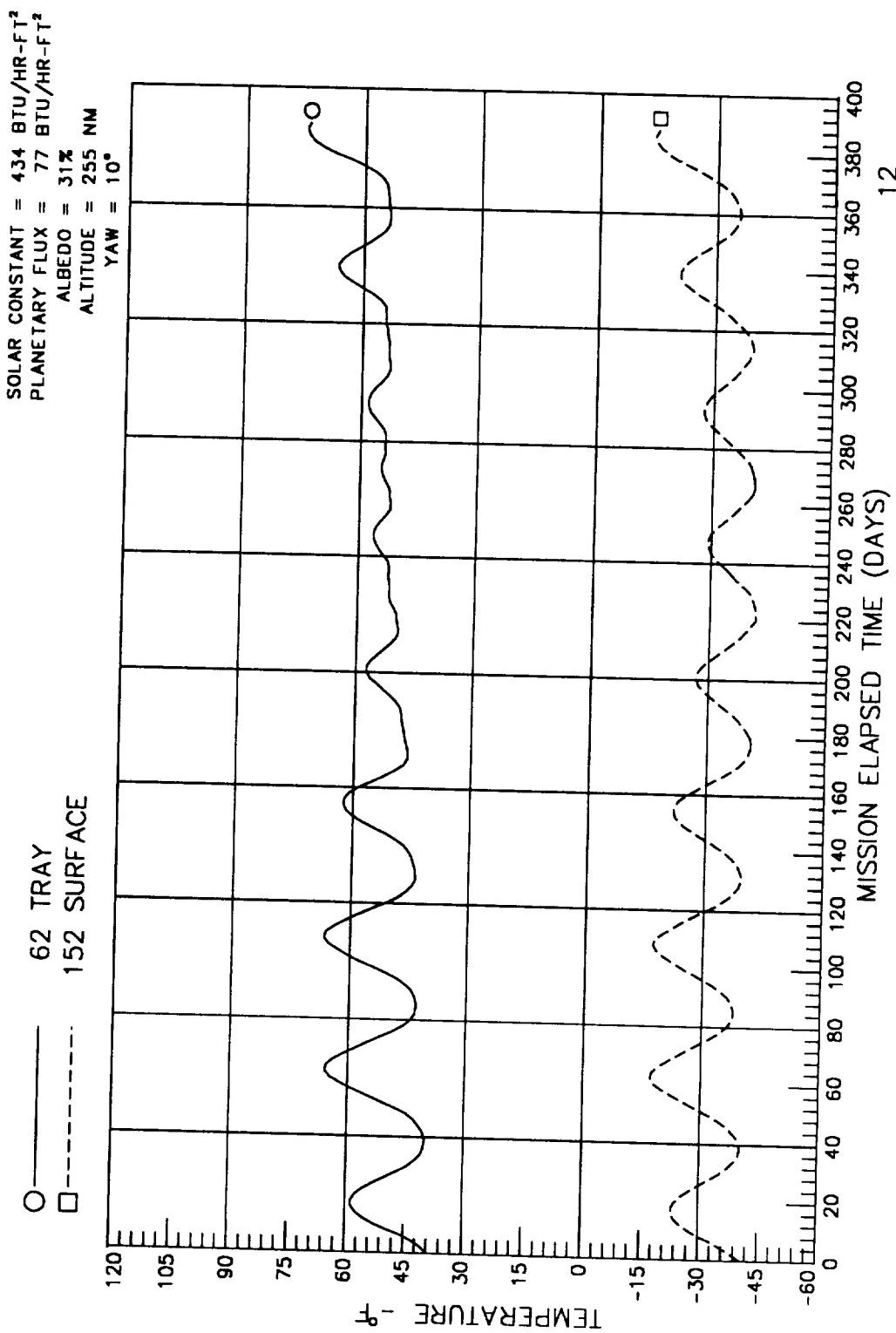
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D2



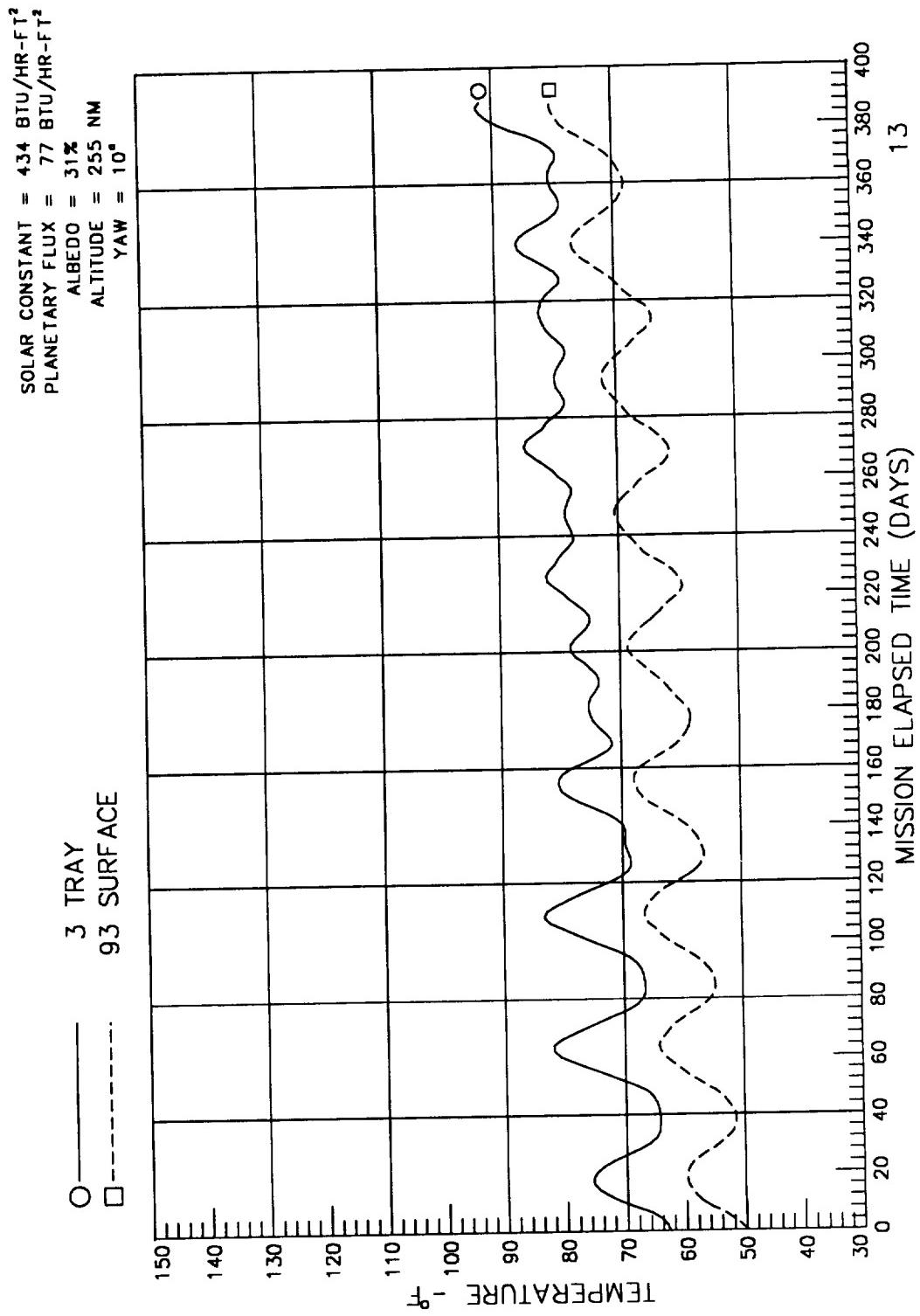
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E2



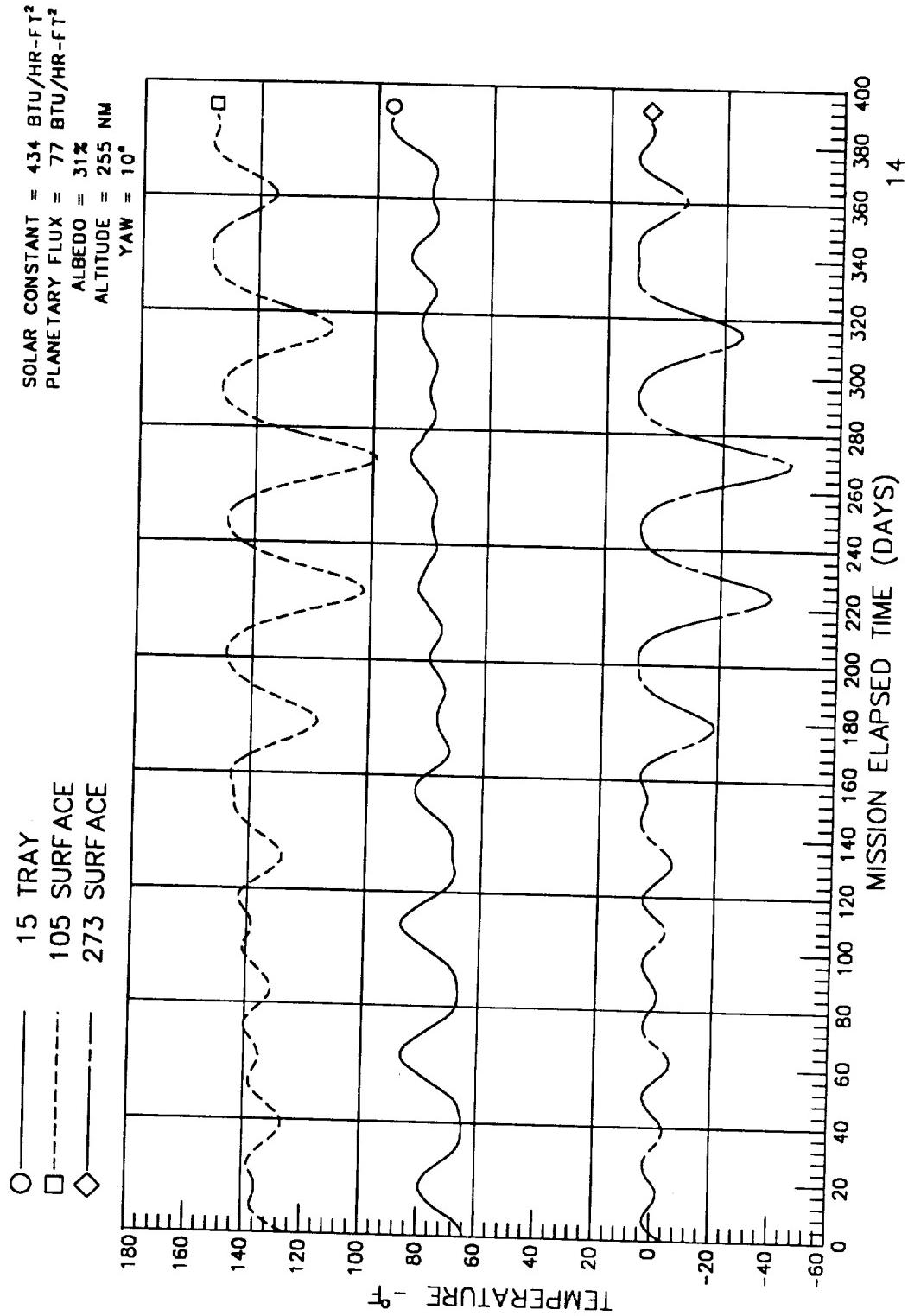
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F2



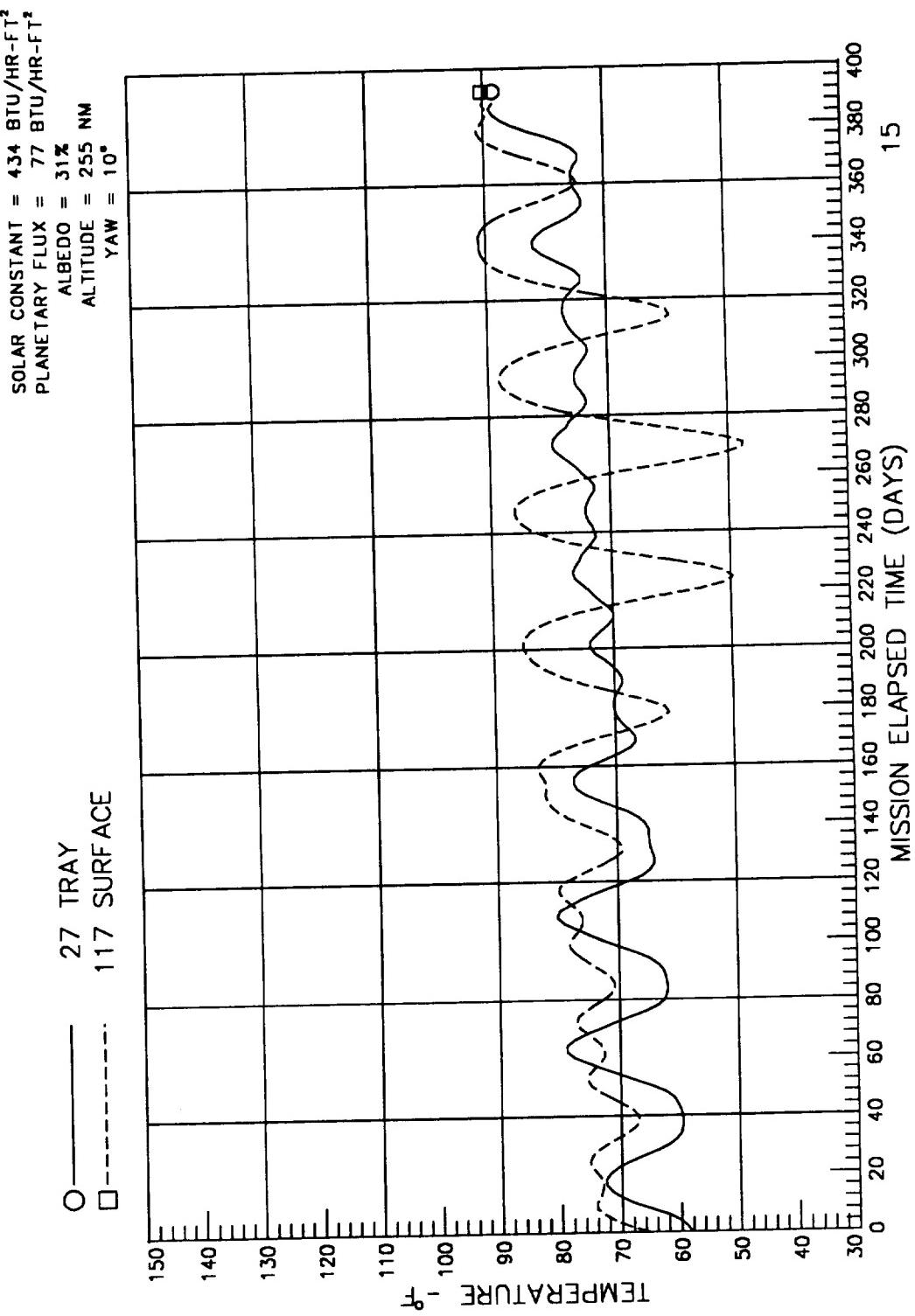
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A3



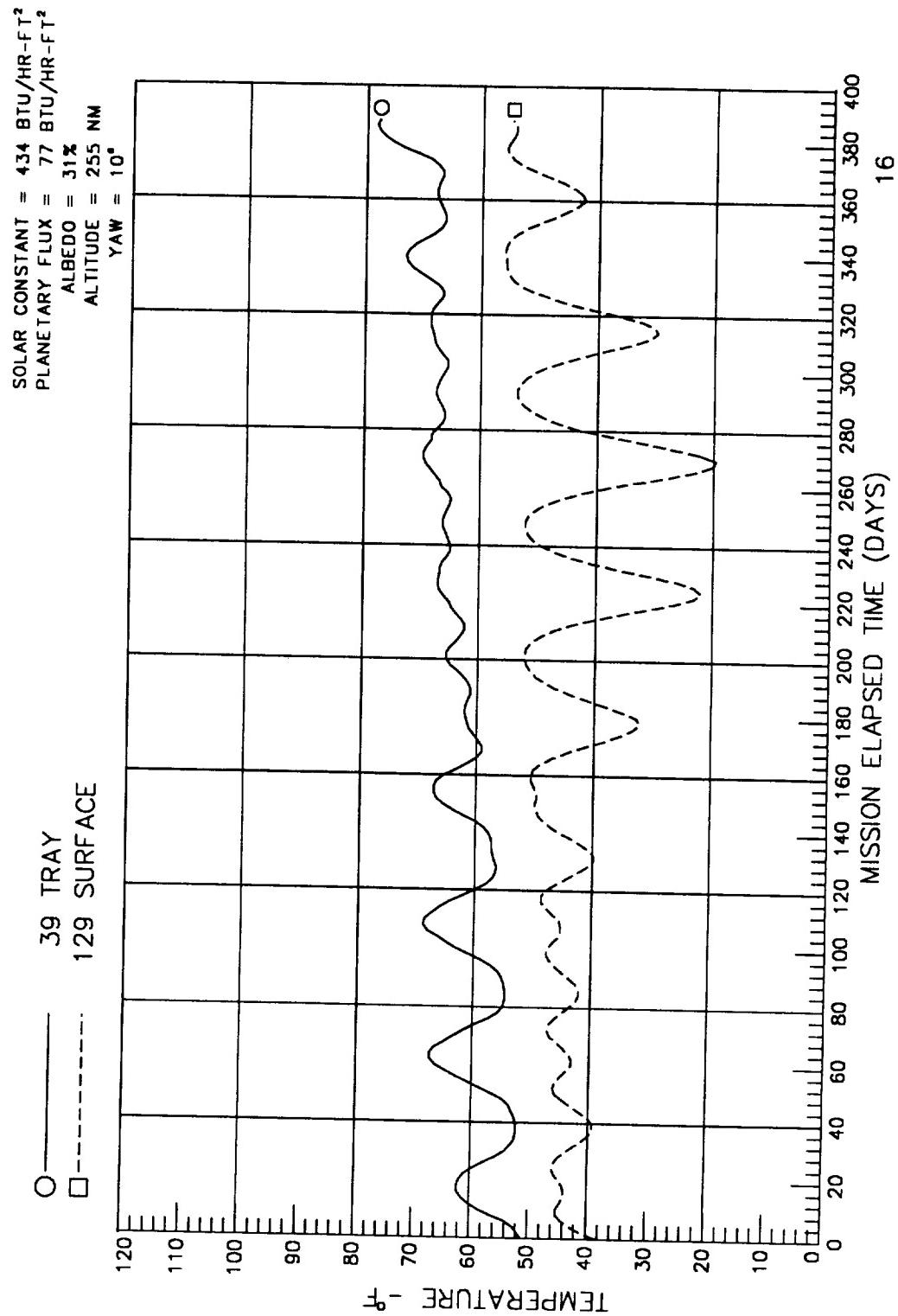
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B3



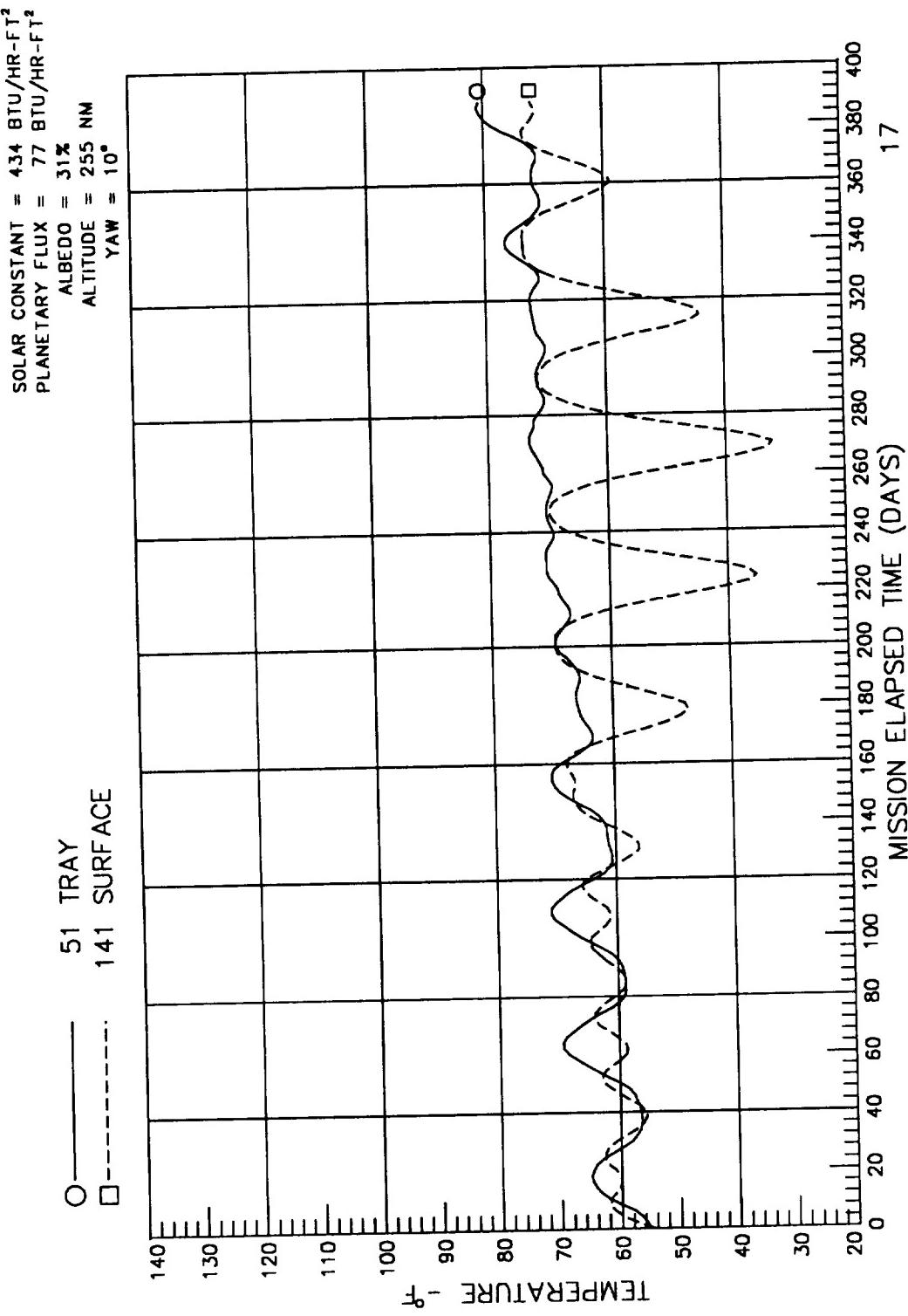
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C3



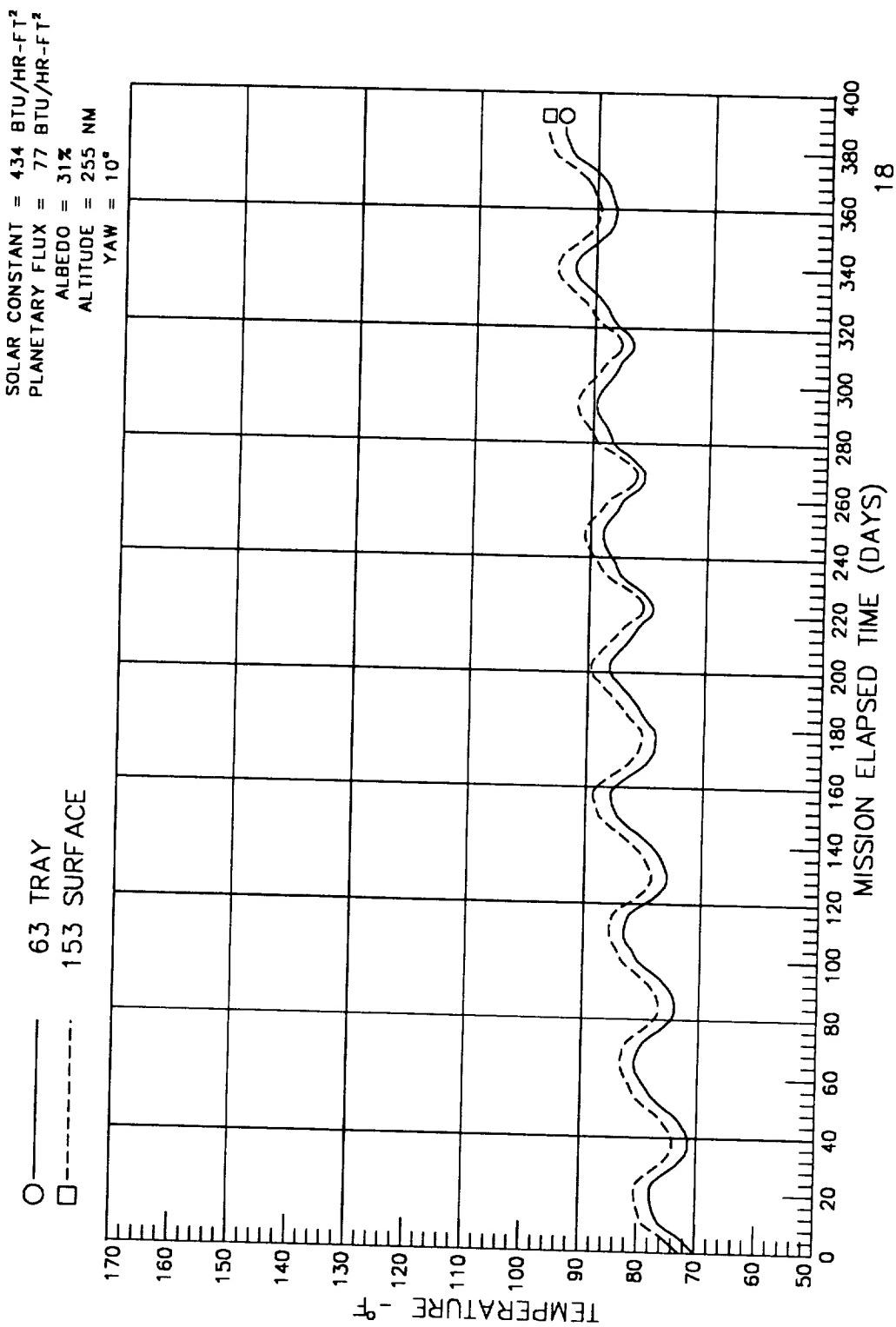
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D3



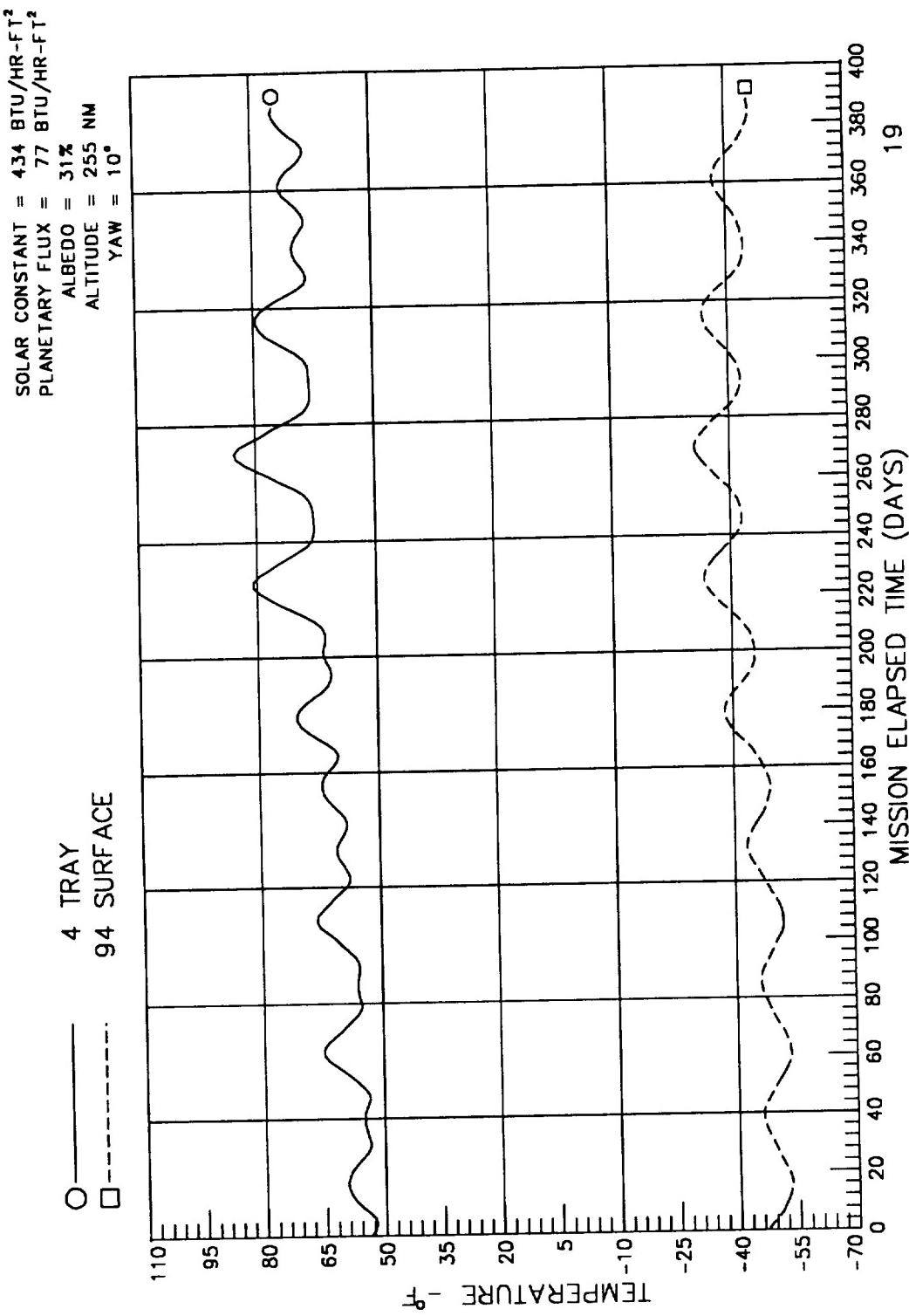
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E3



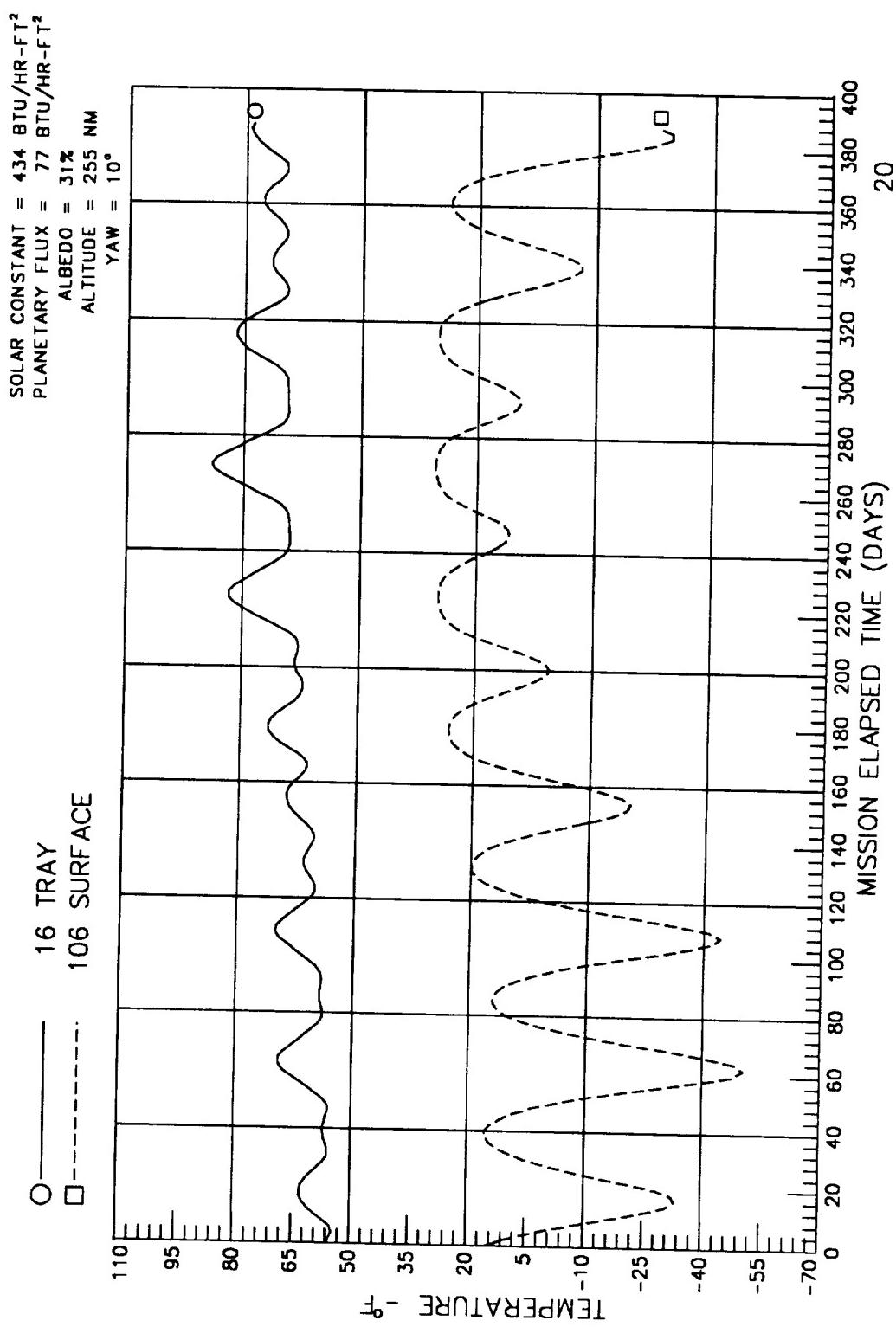
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F3



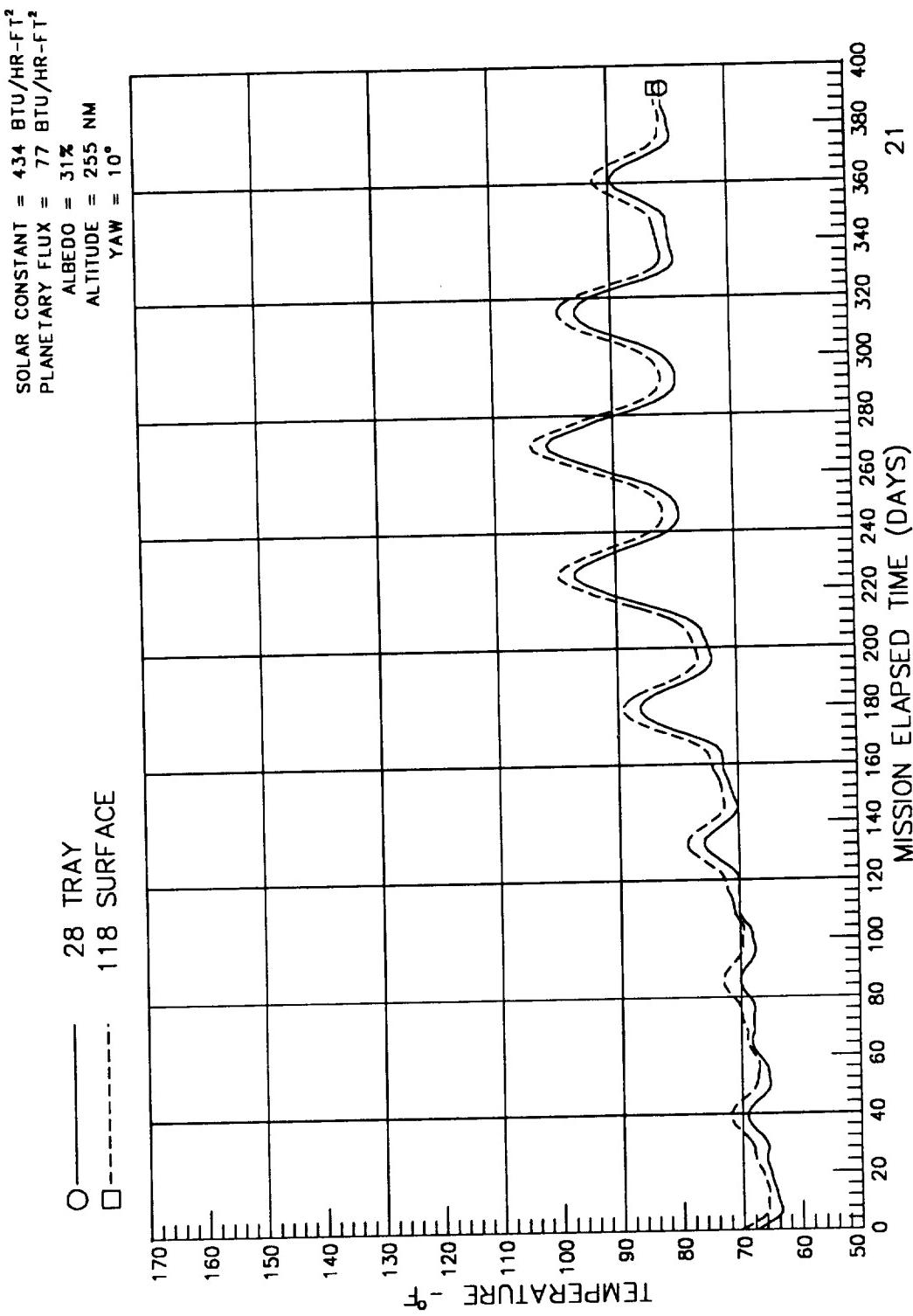
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
LOCATION: A4



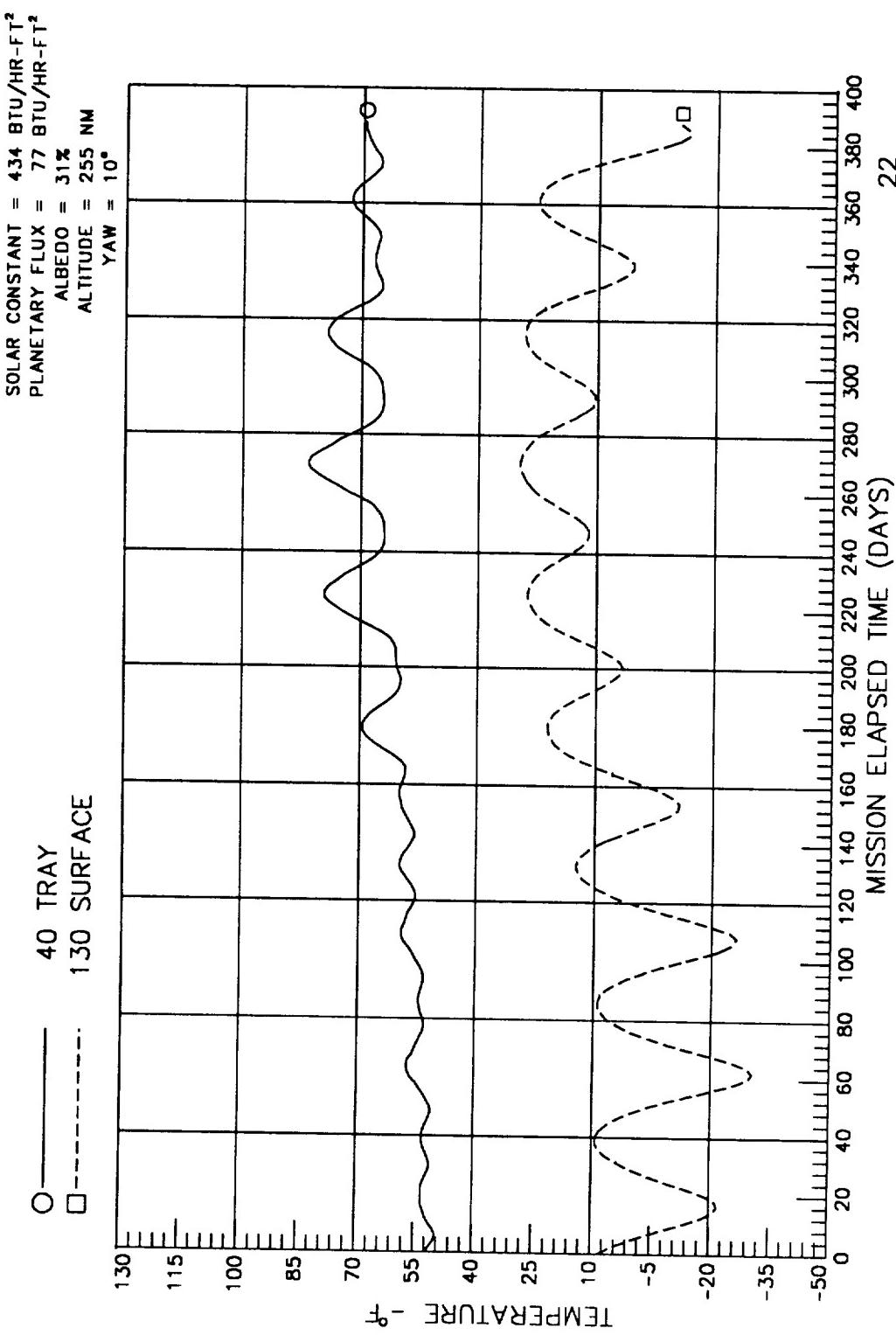
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
LOCATION: BT



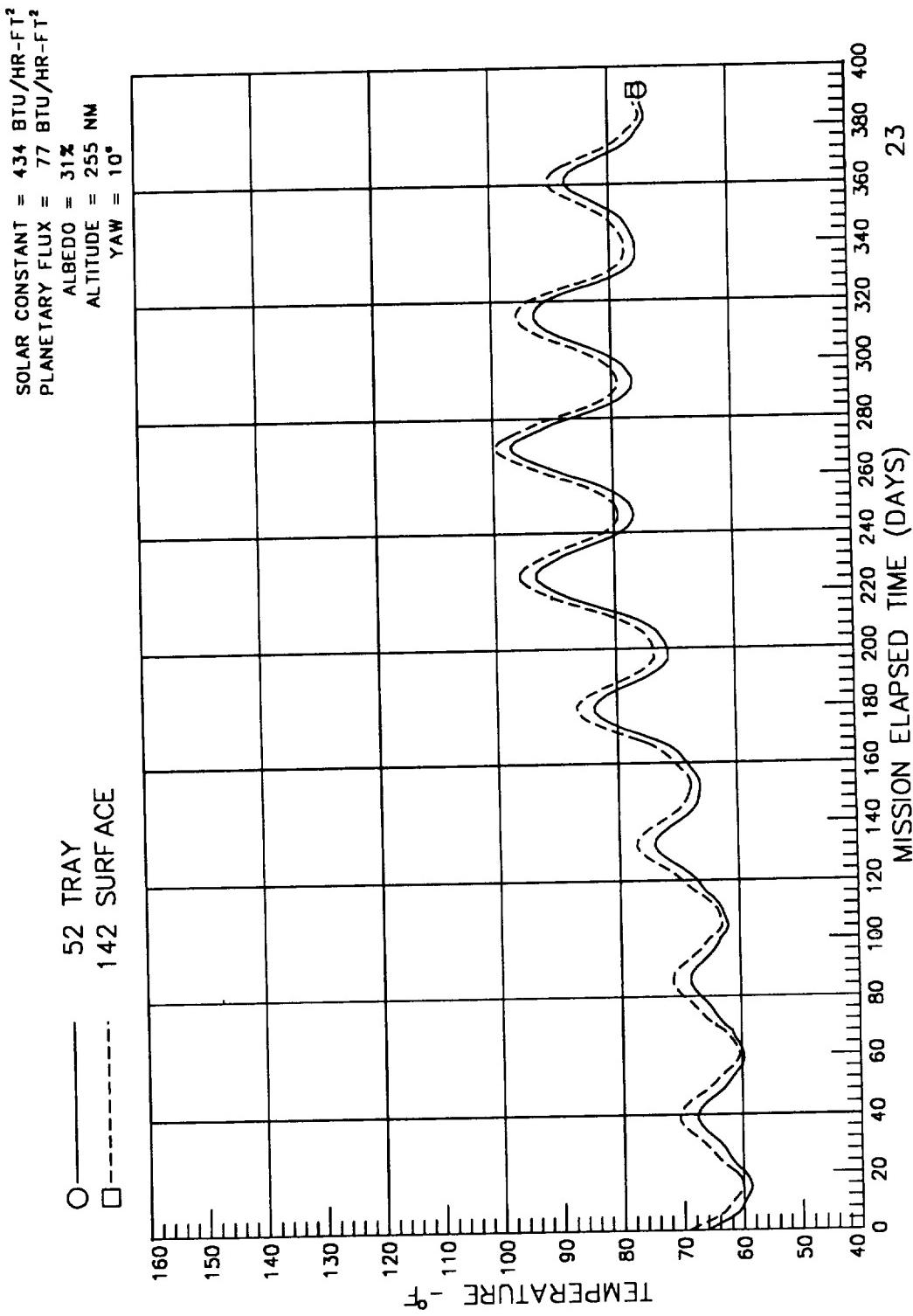
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C4



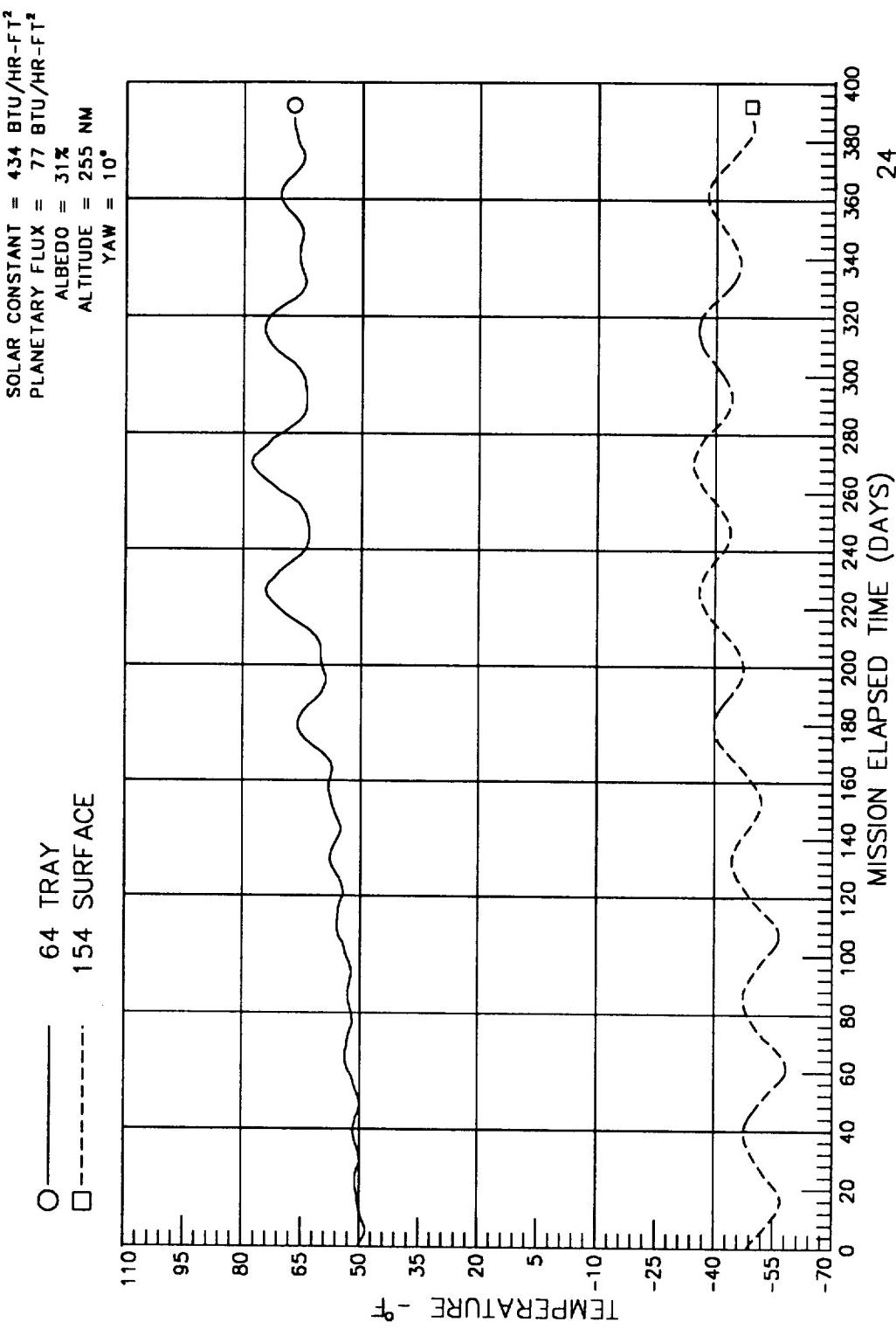
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D4



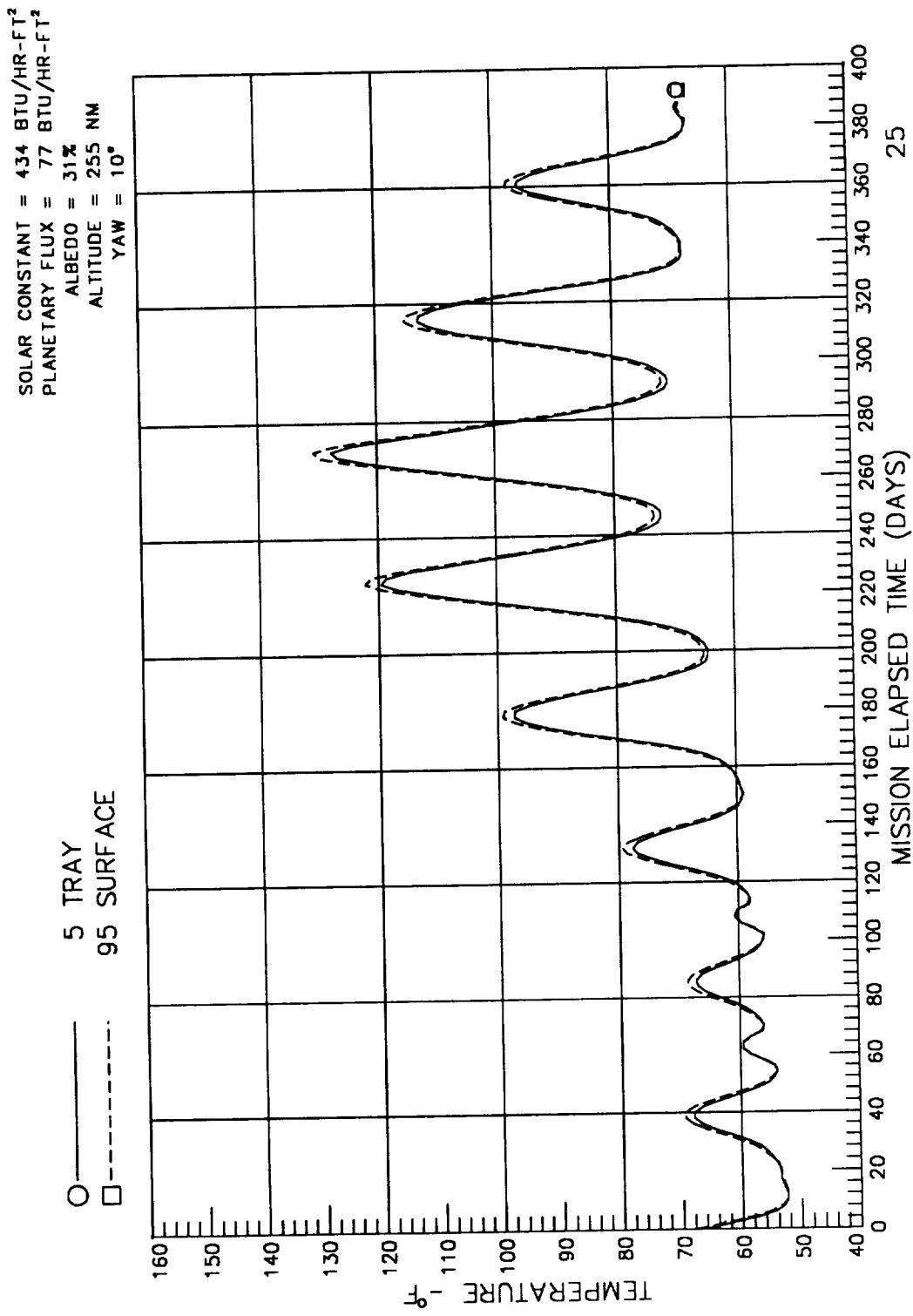
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E4



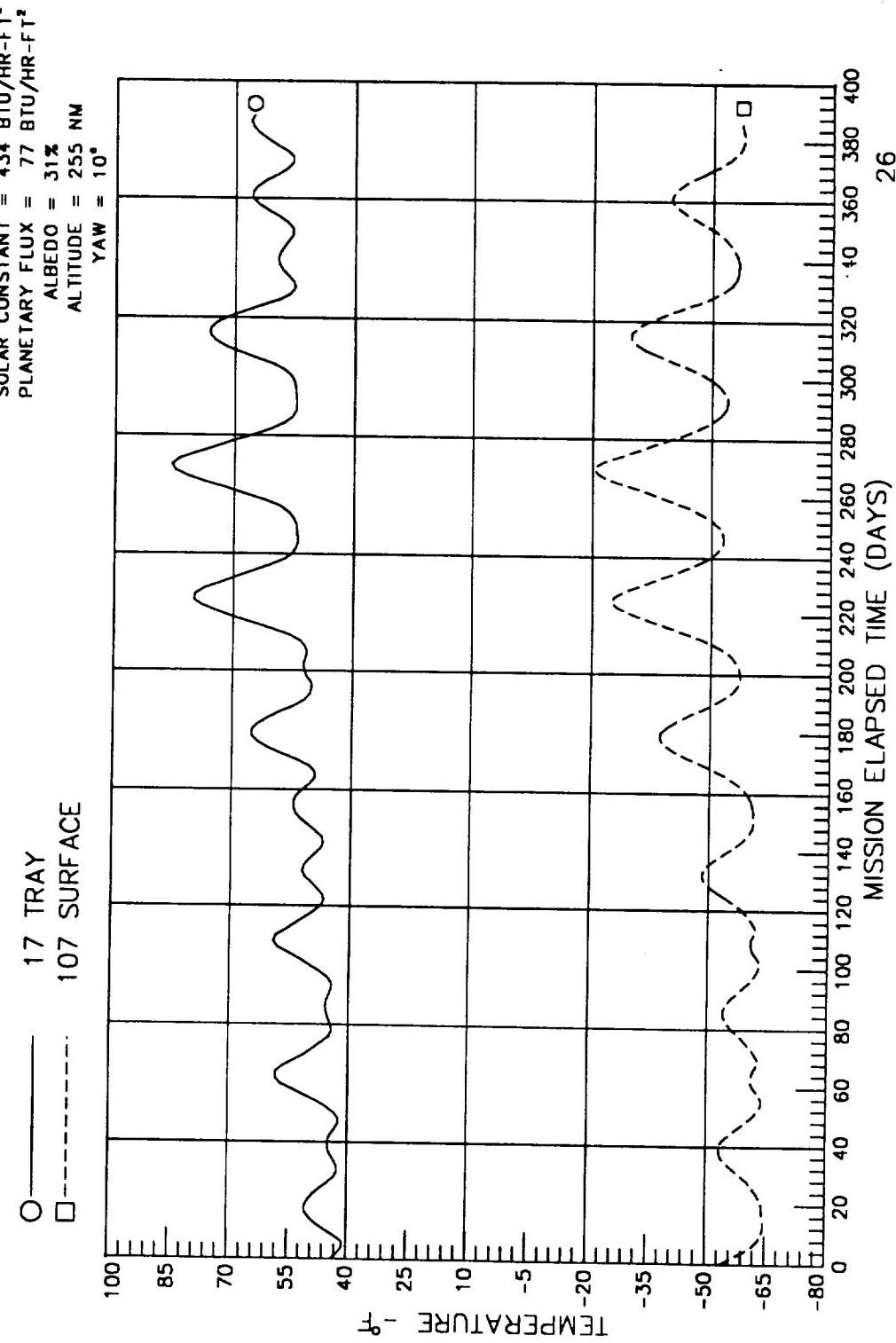
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F4



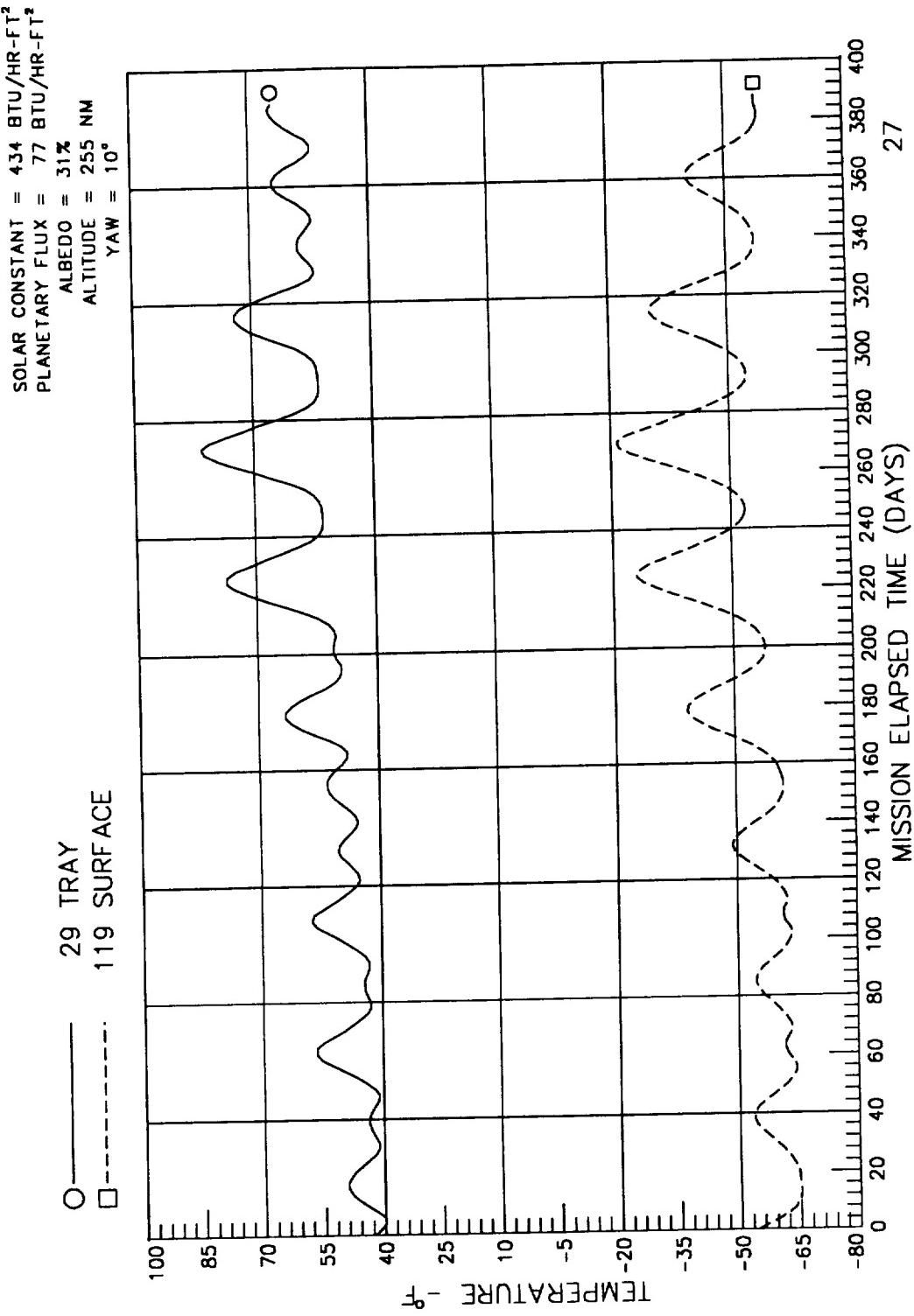
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A5



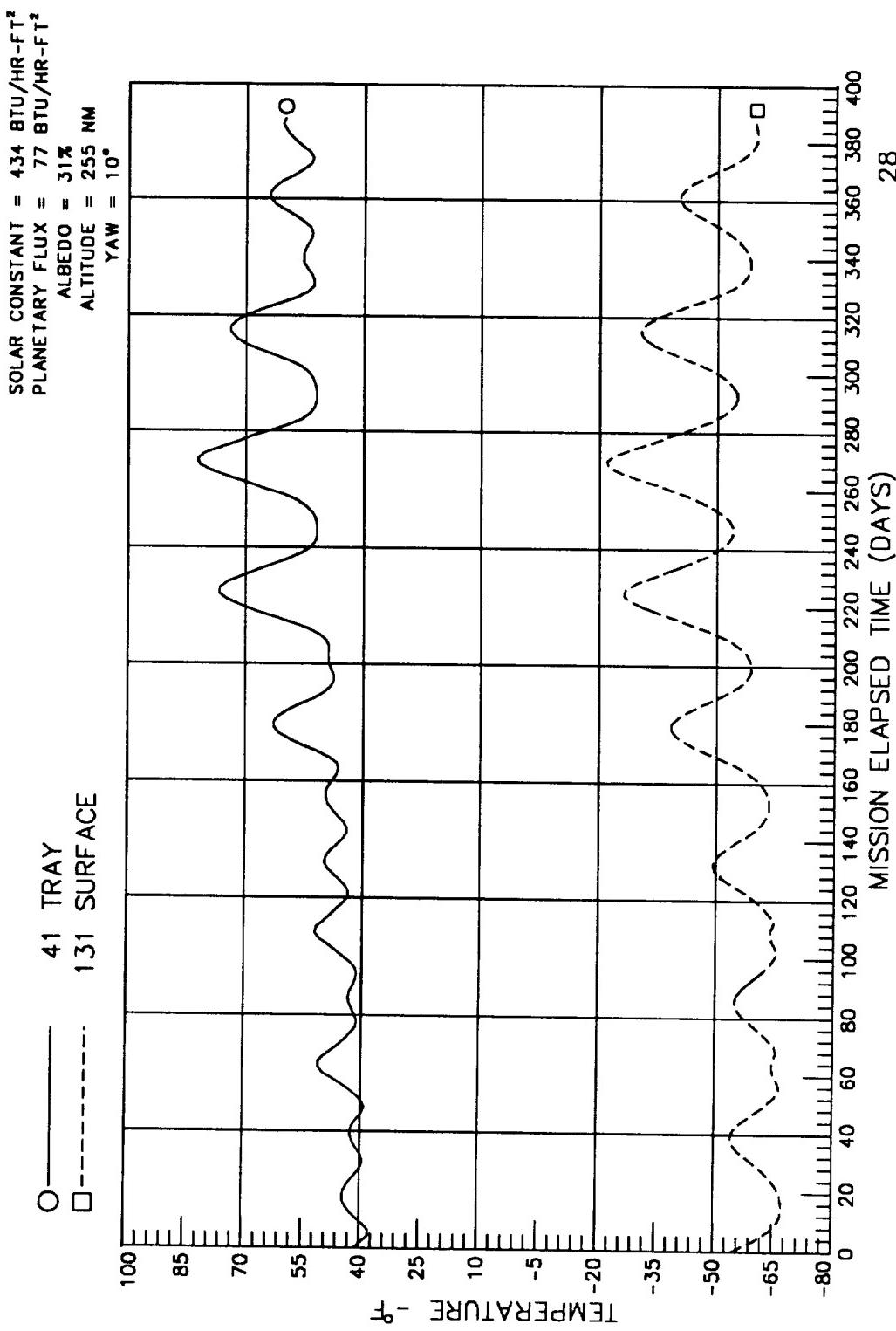
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B5



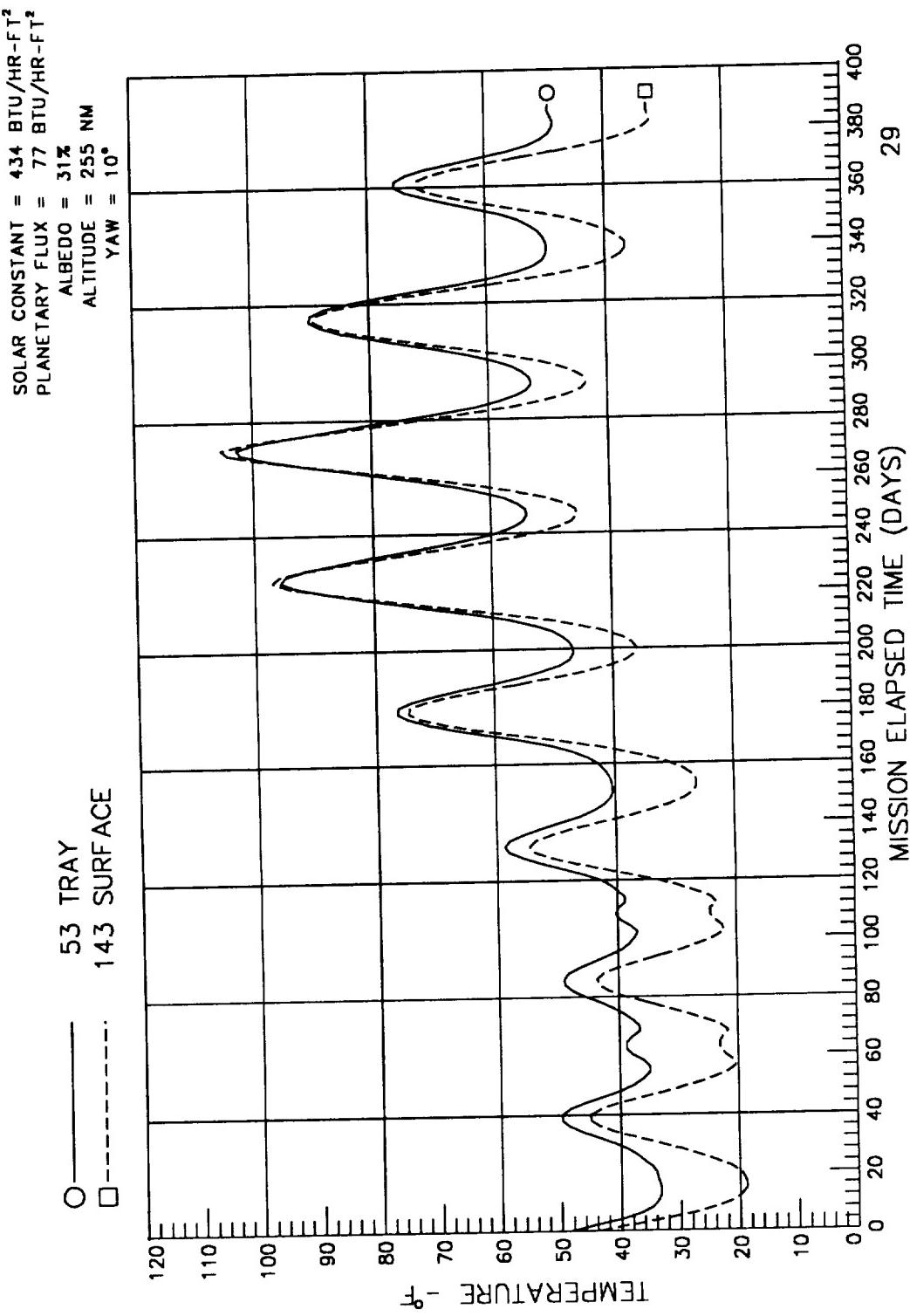
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C5



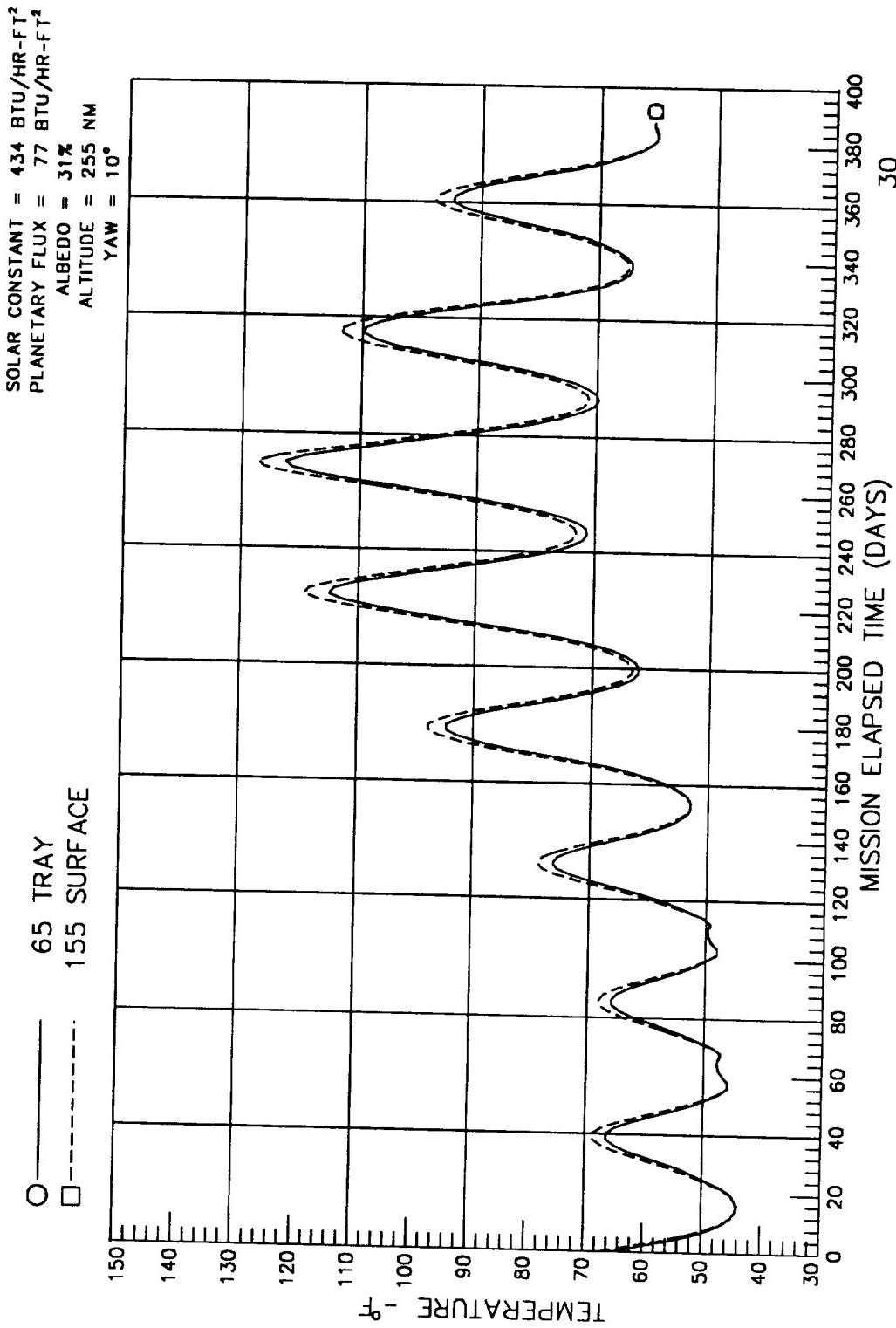
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D5



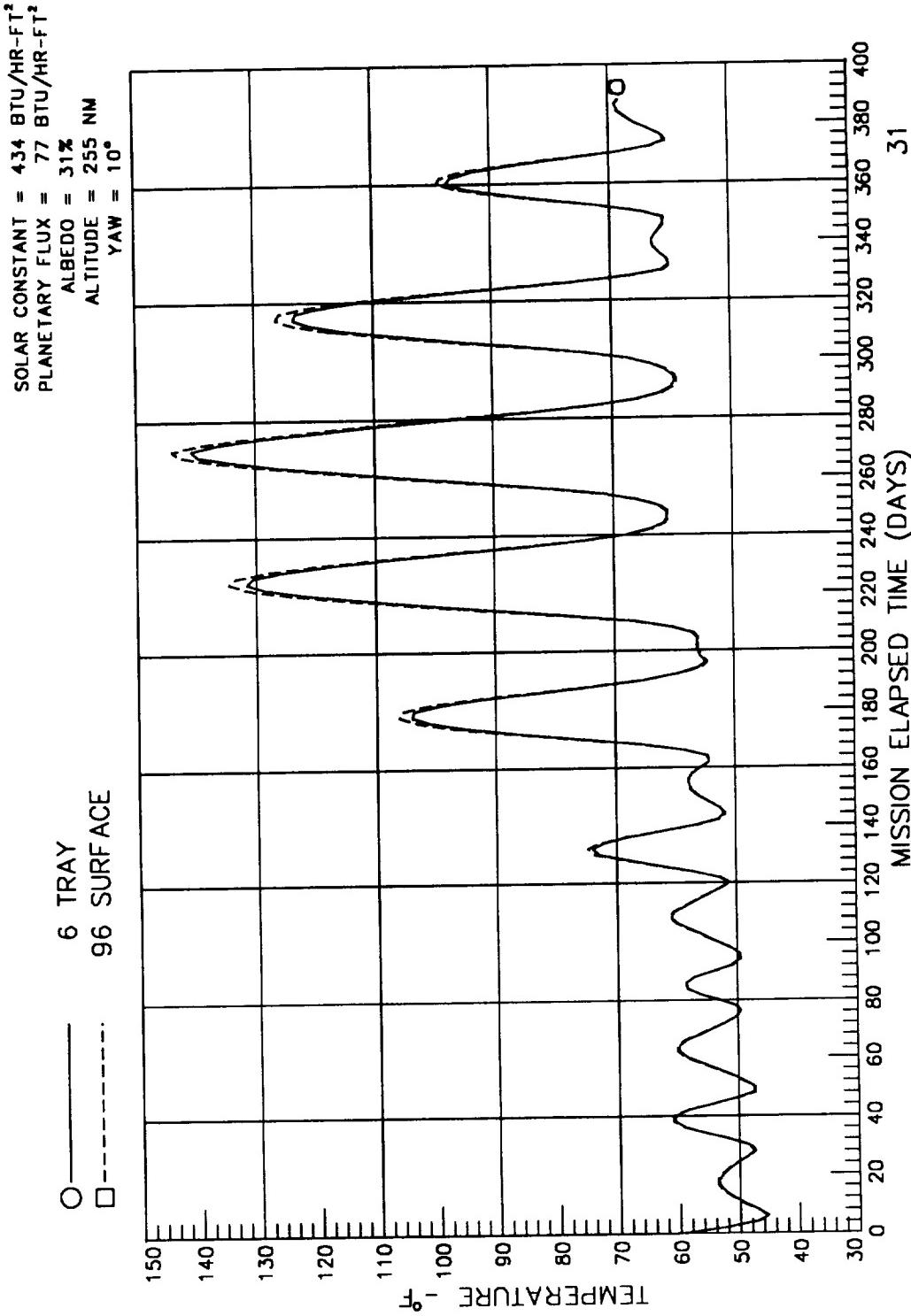
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E5



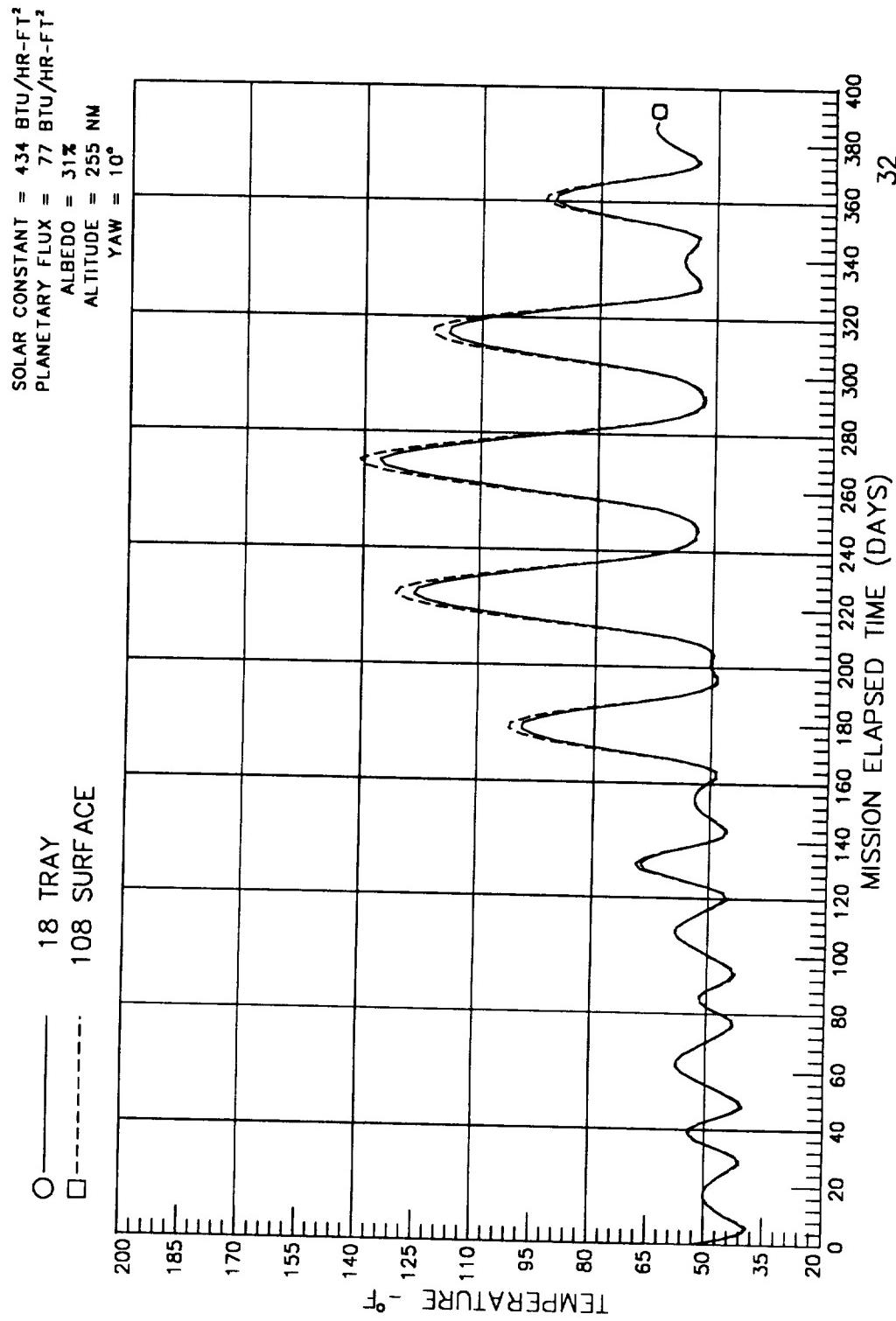
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F5



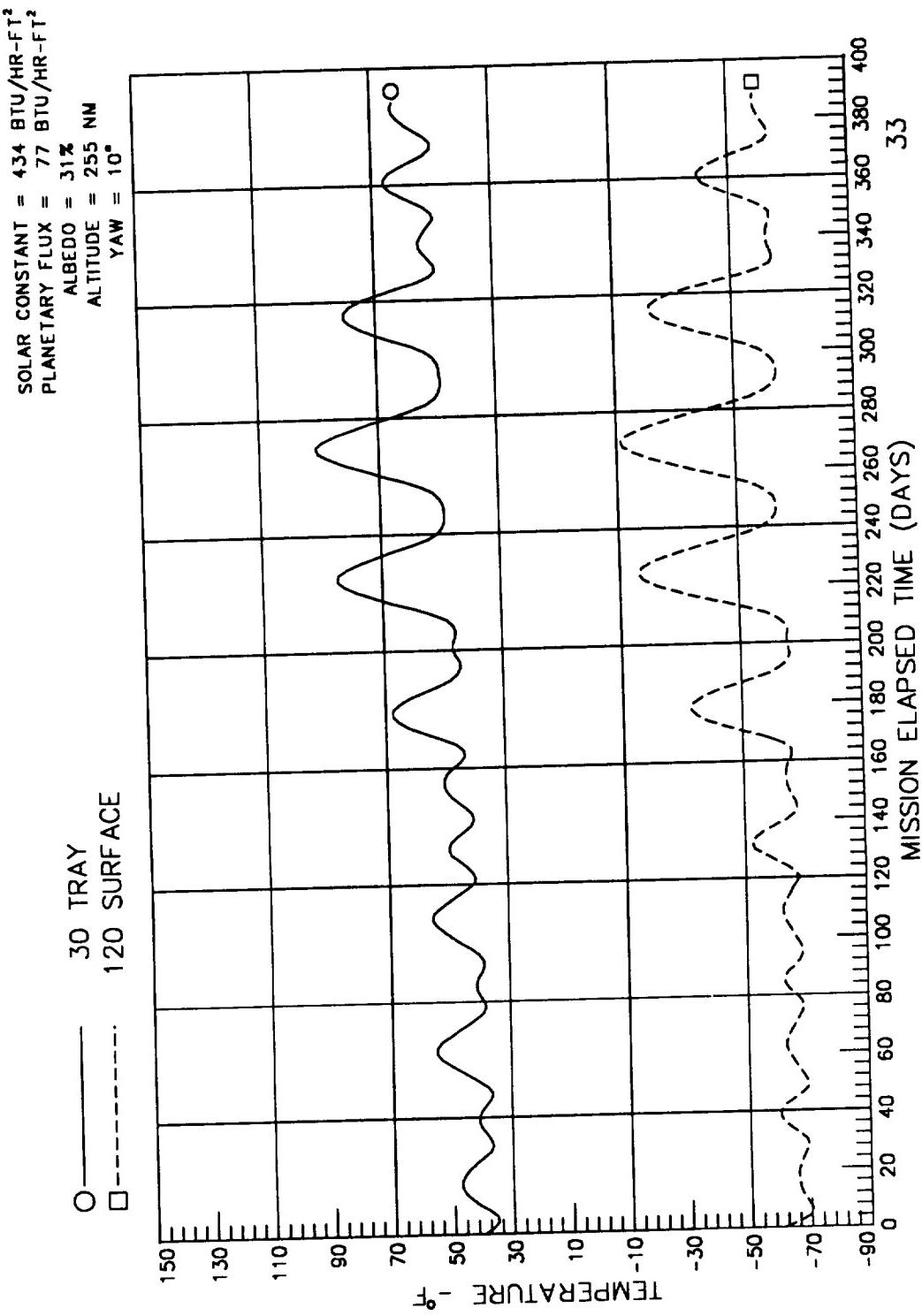
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A6



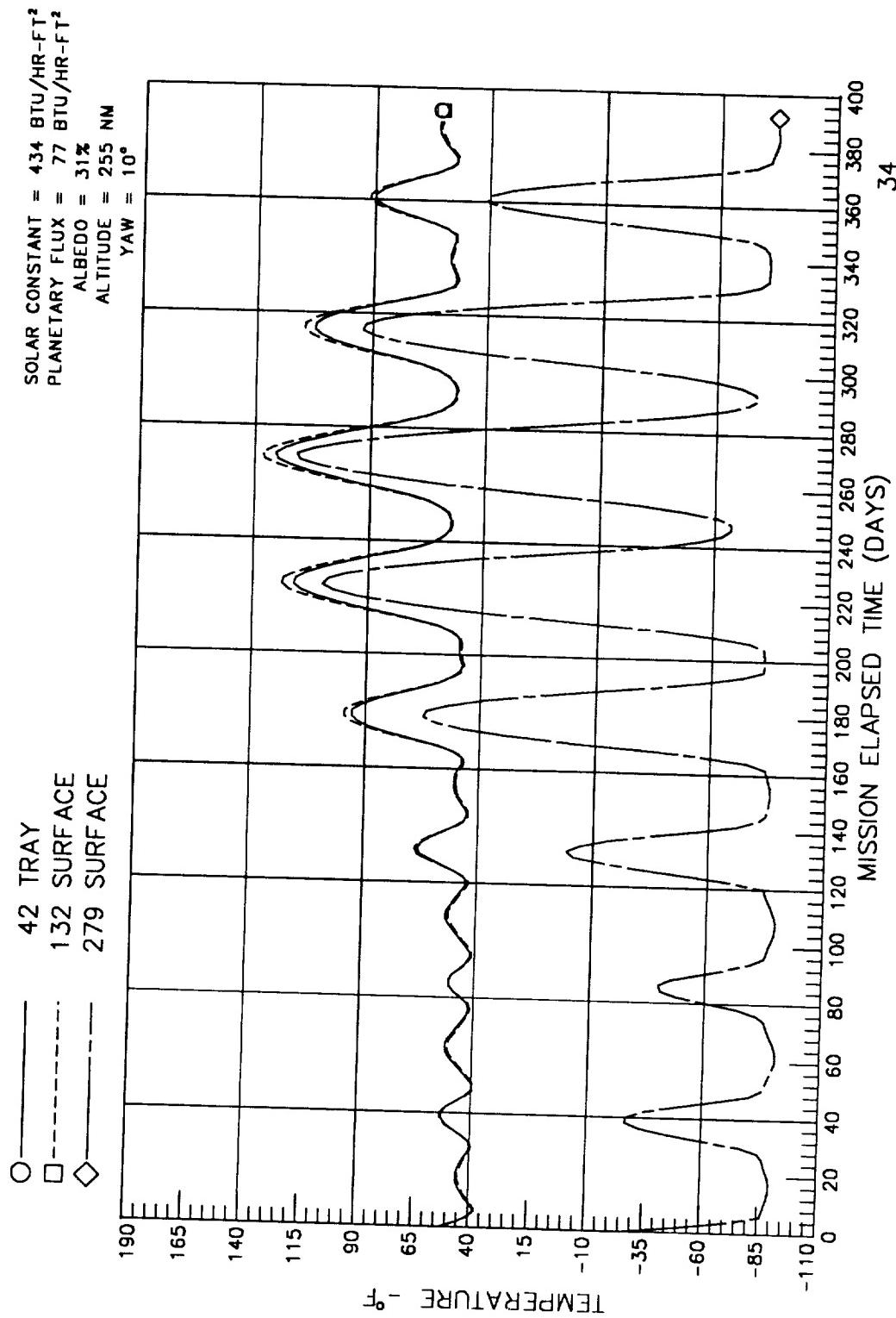
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B6



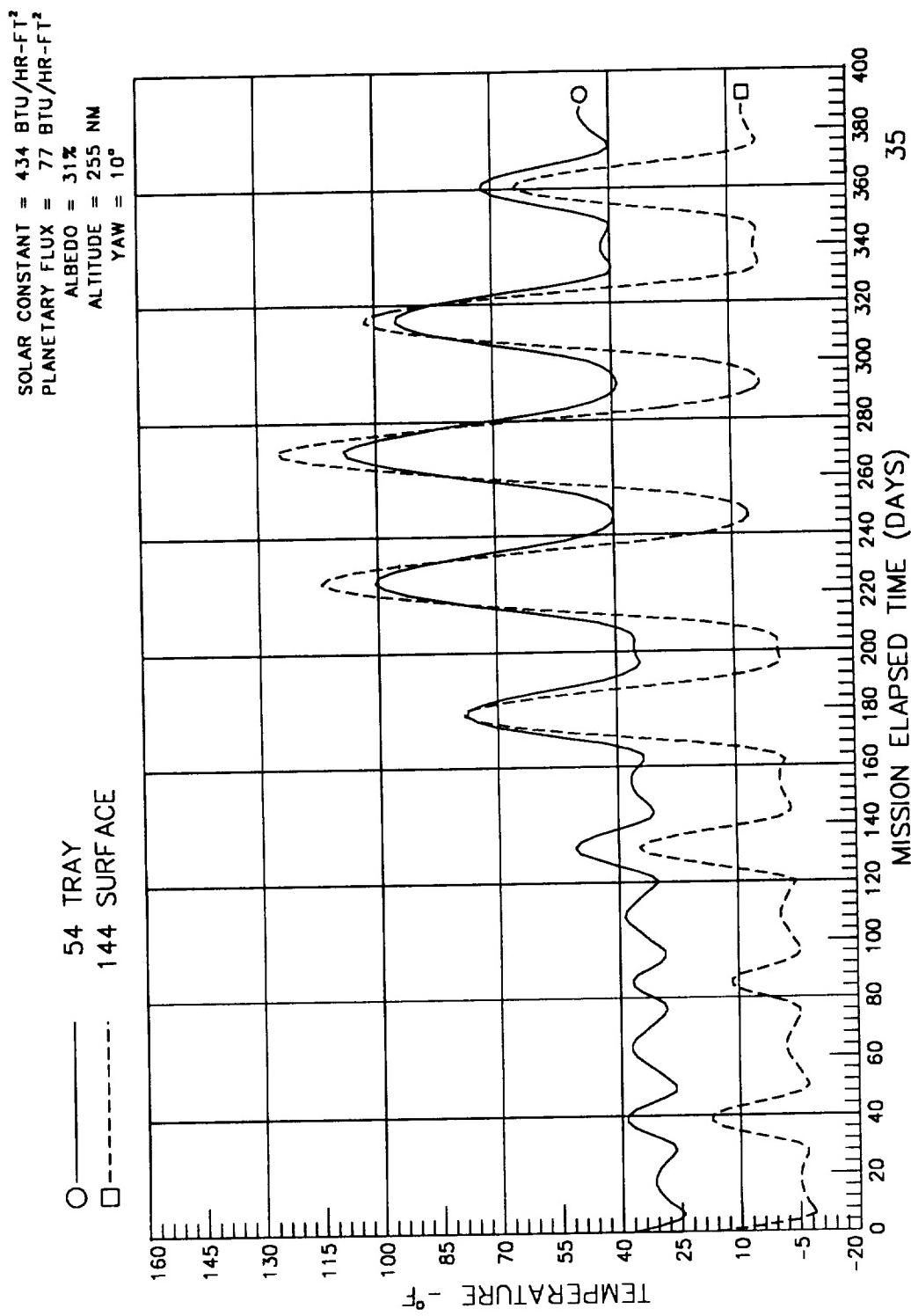
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C6



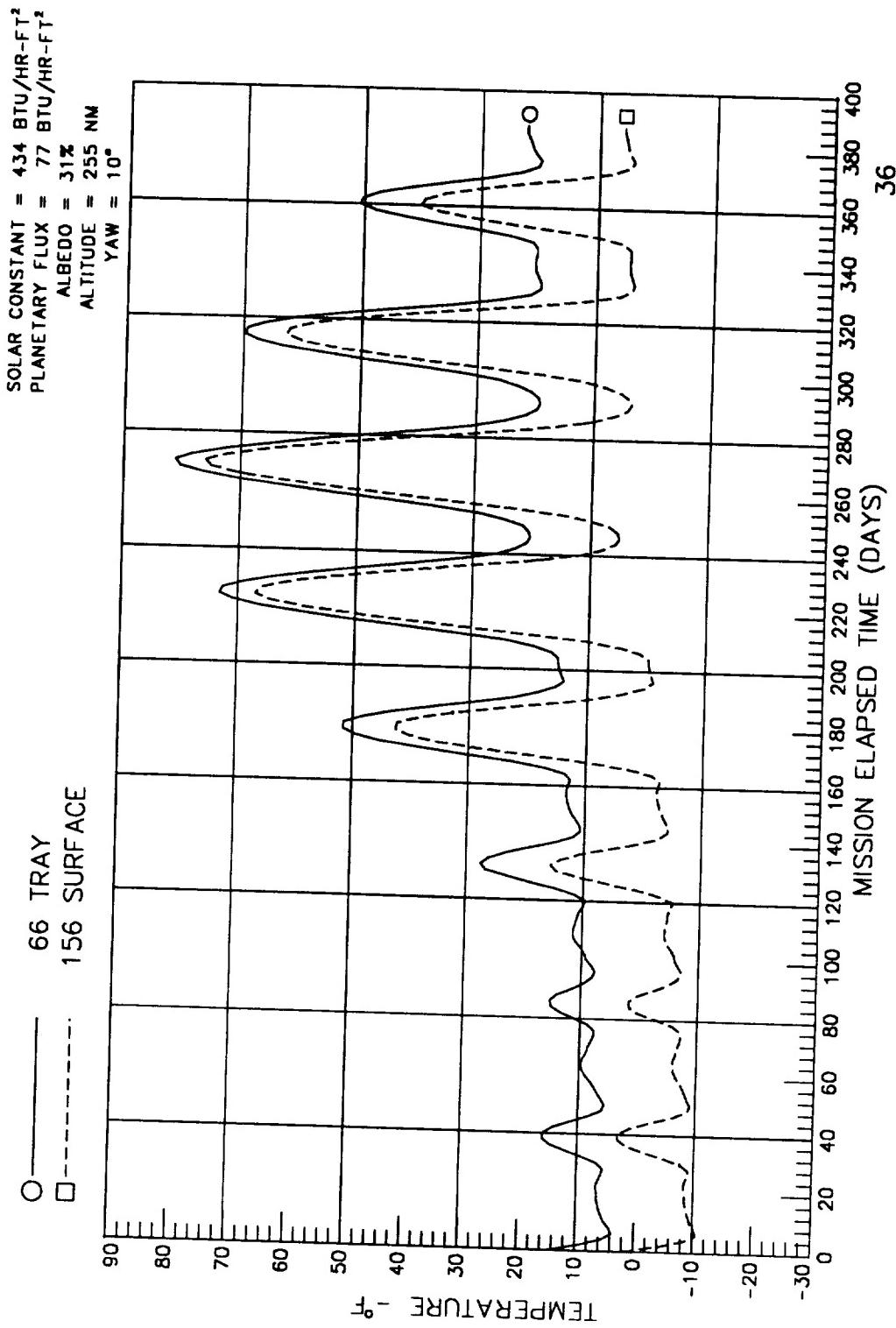
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D6



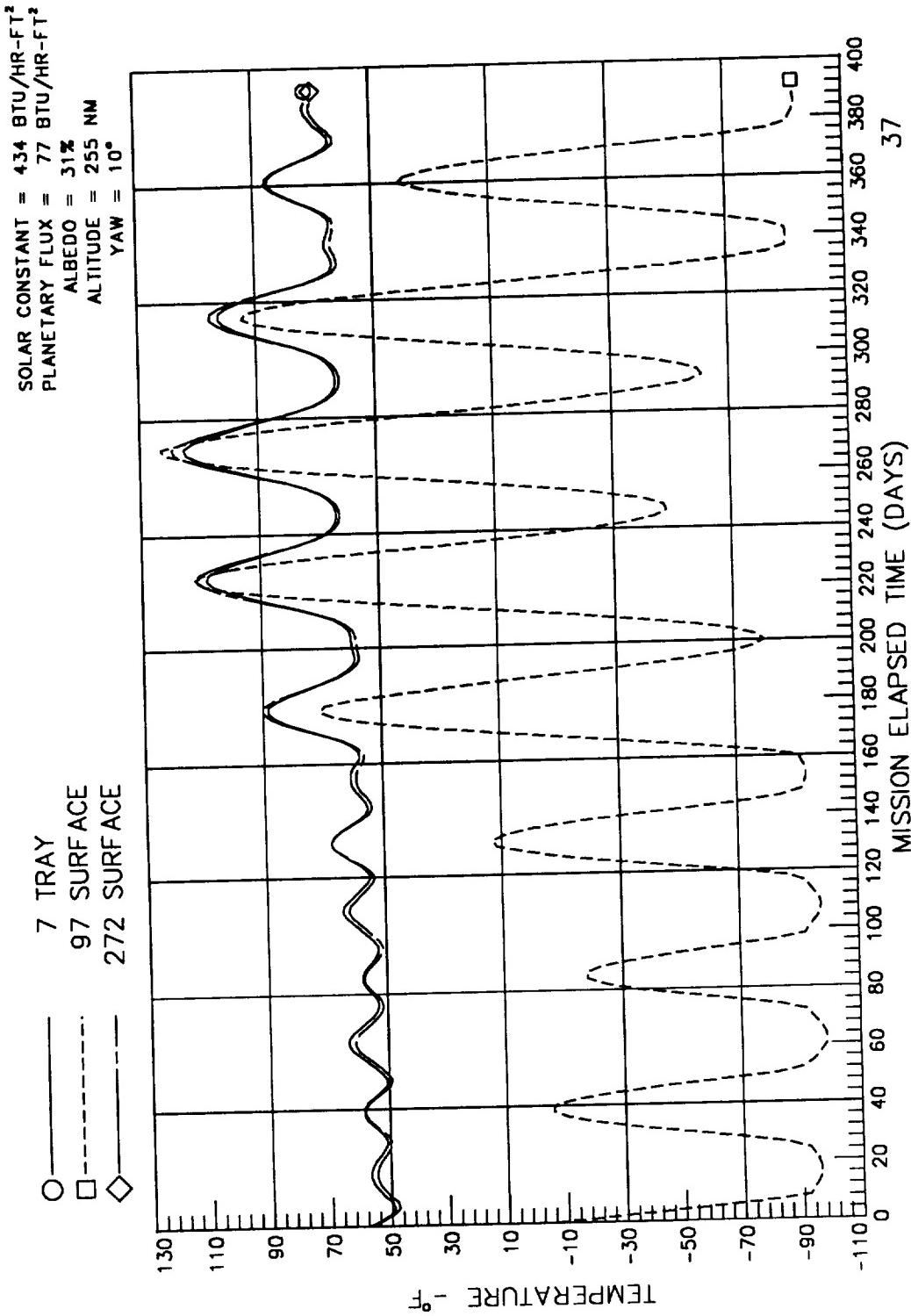
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E6



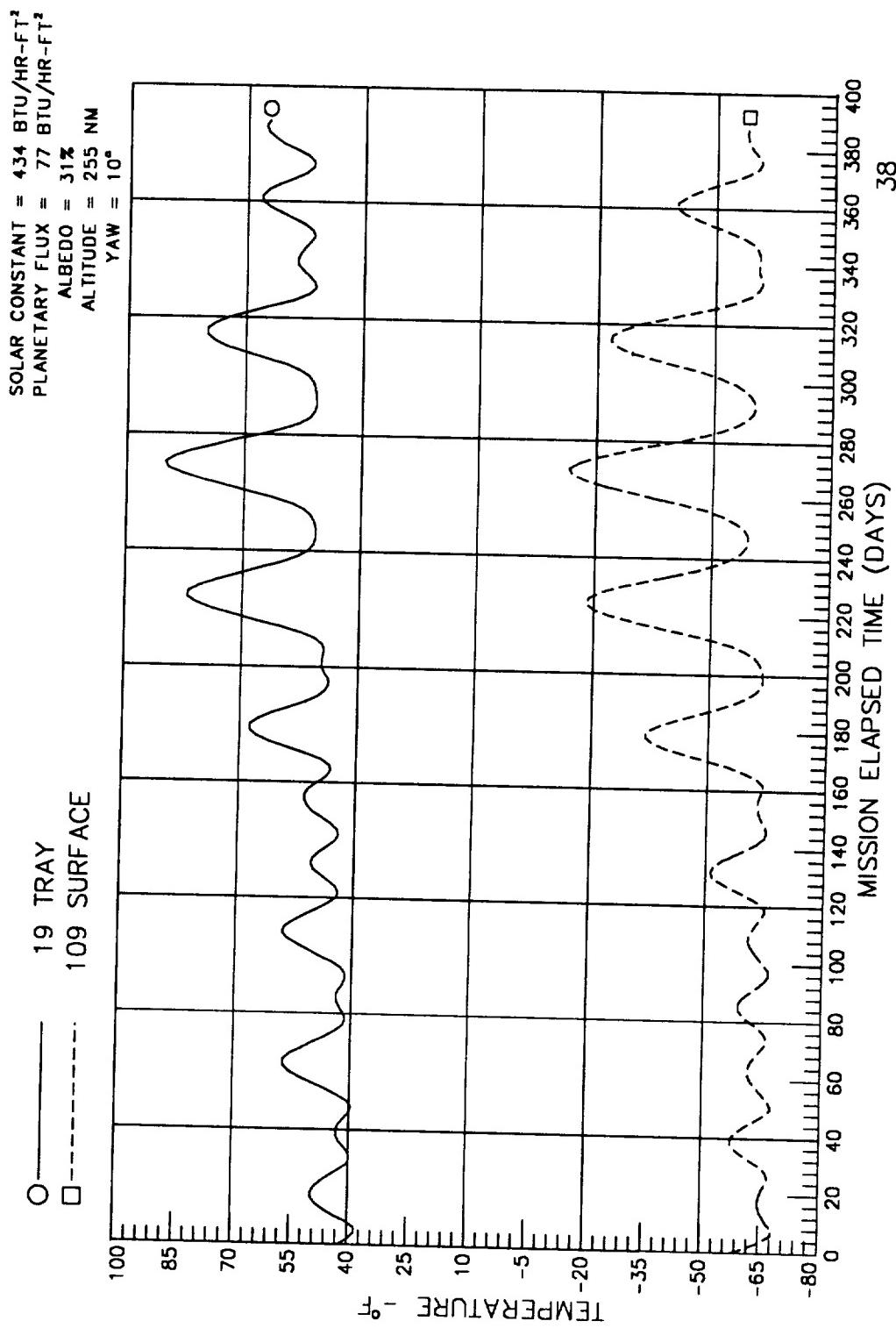
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F6



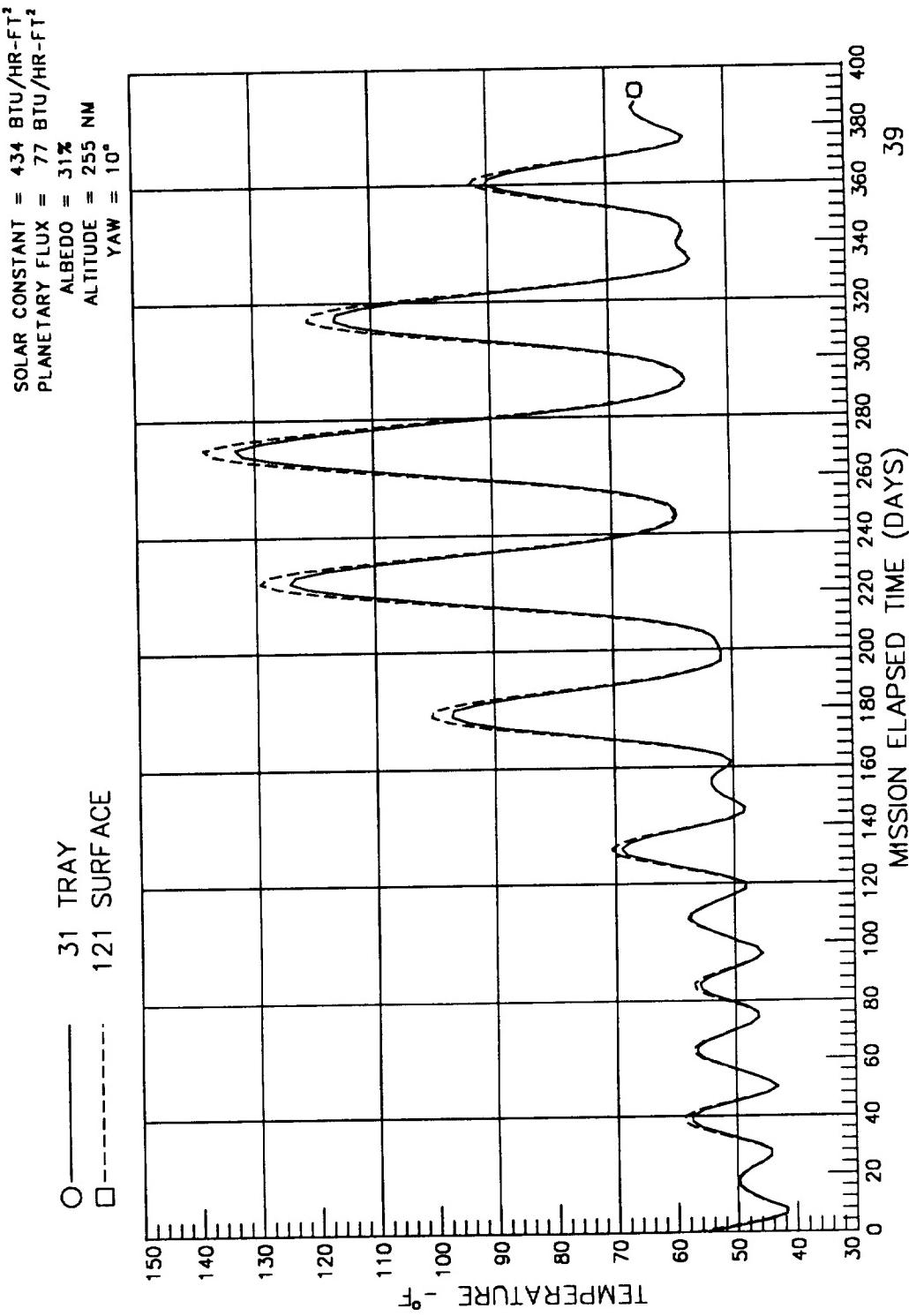
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A7



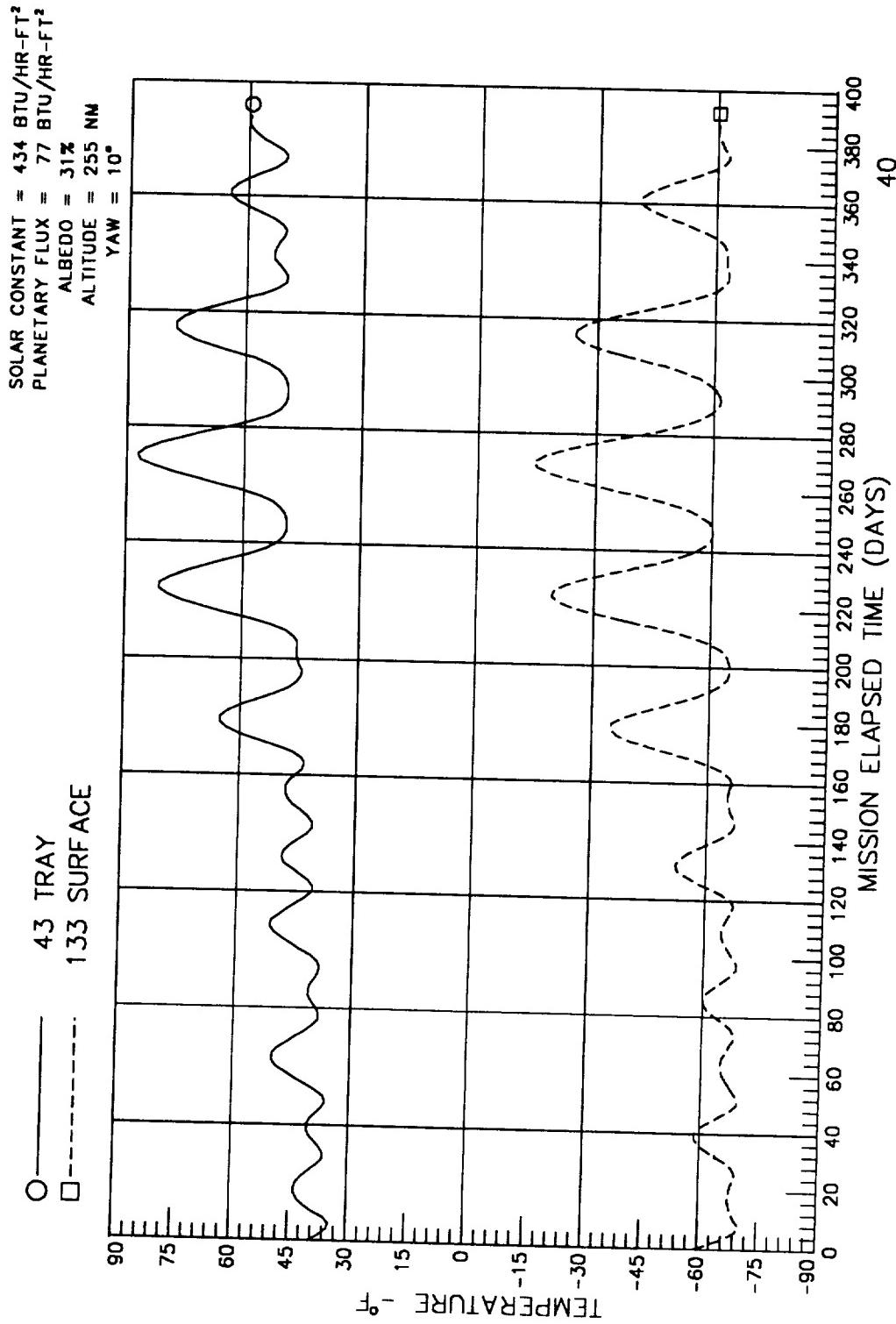
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B7



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C7



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D7



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E7

SOLAR CONSTANT = 434 BTU/HR-FT²

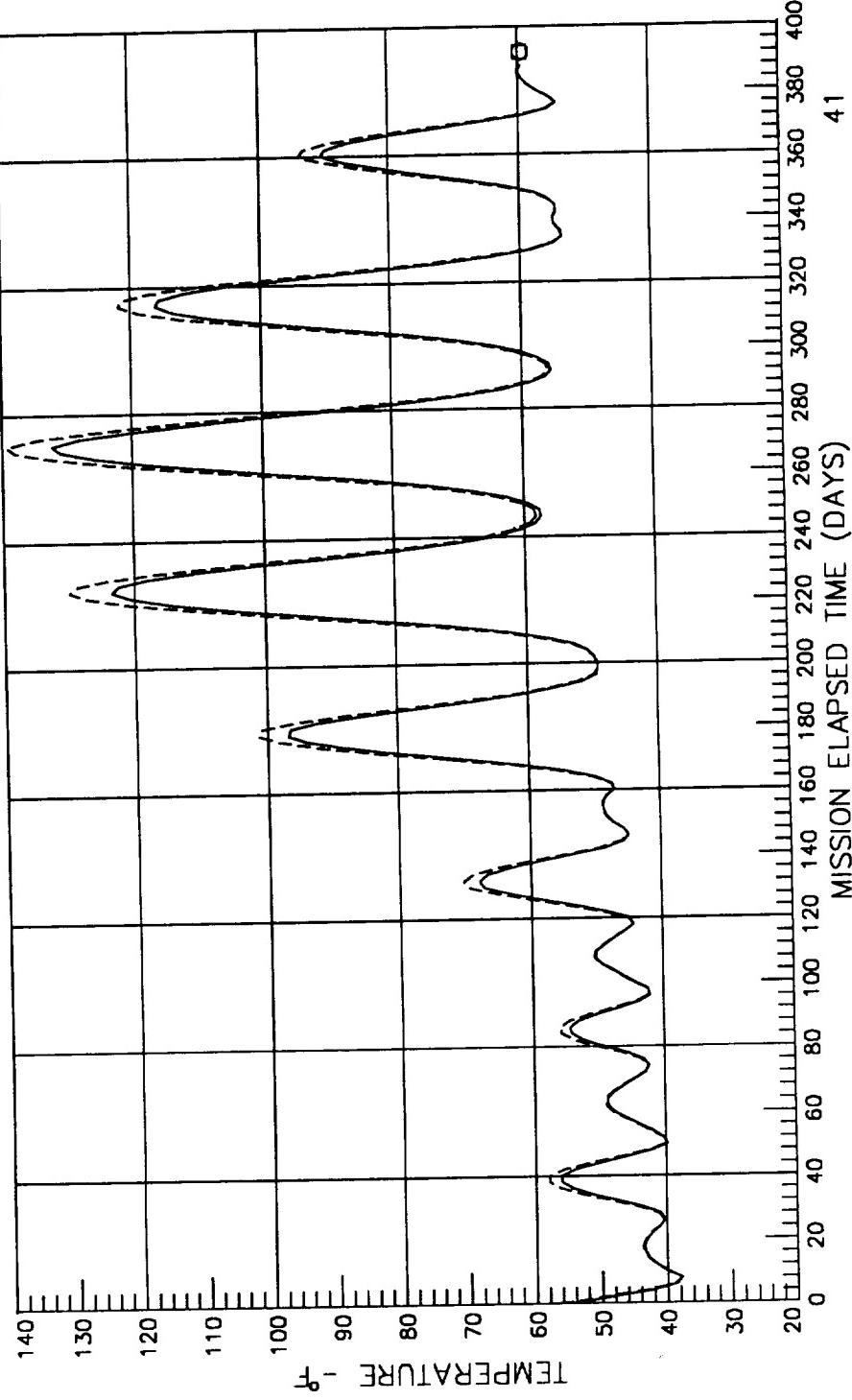
PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%

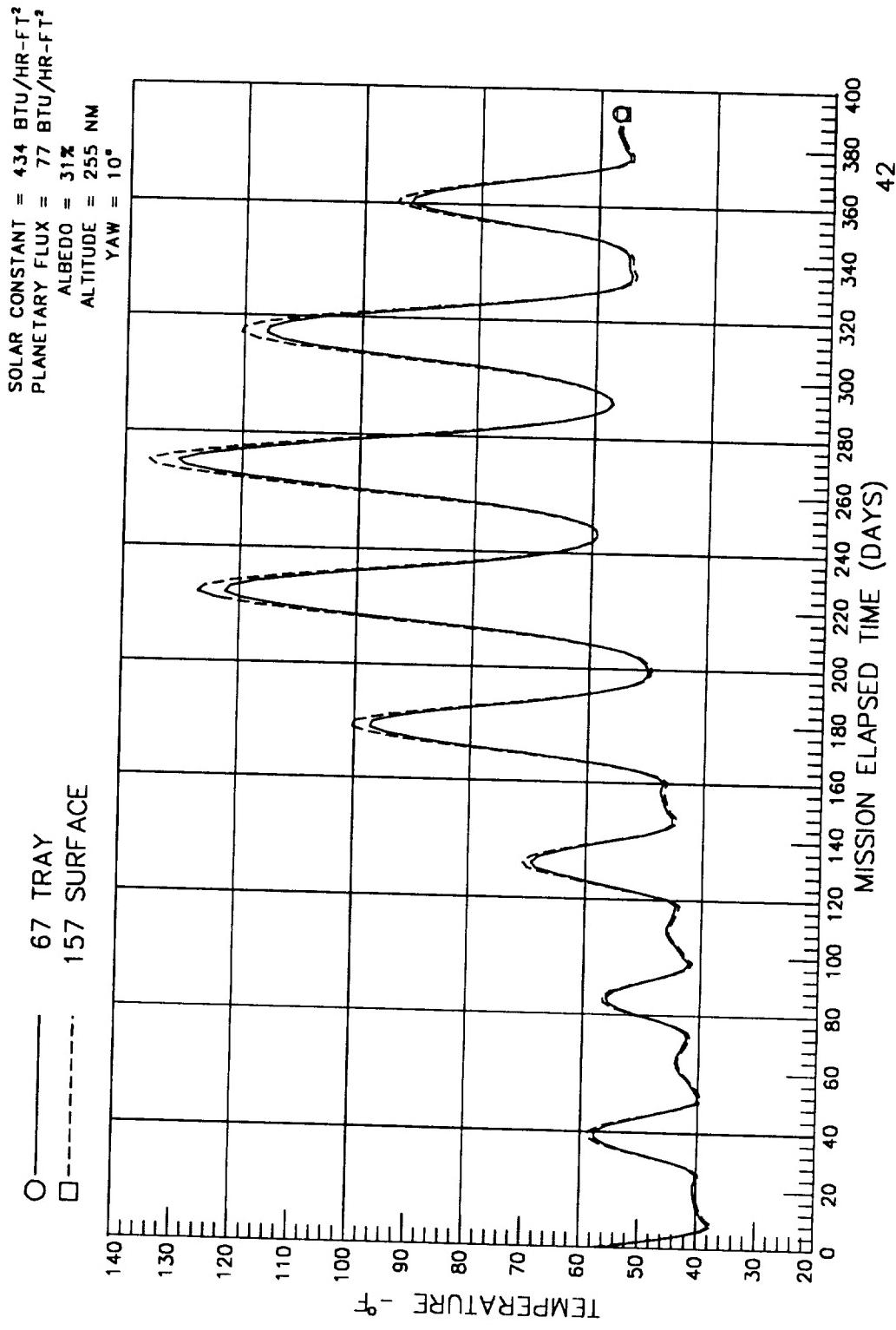
ALTITUDE = 255 NM

YAW = 10°

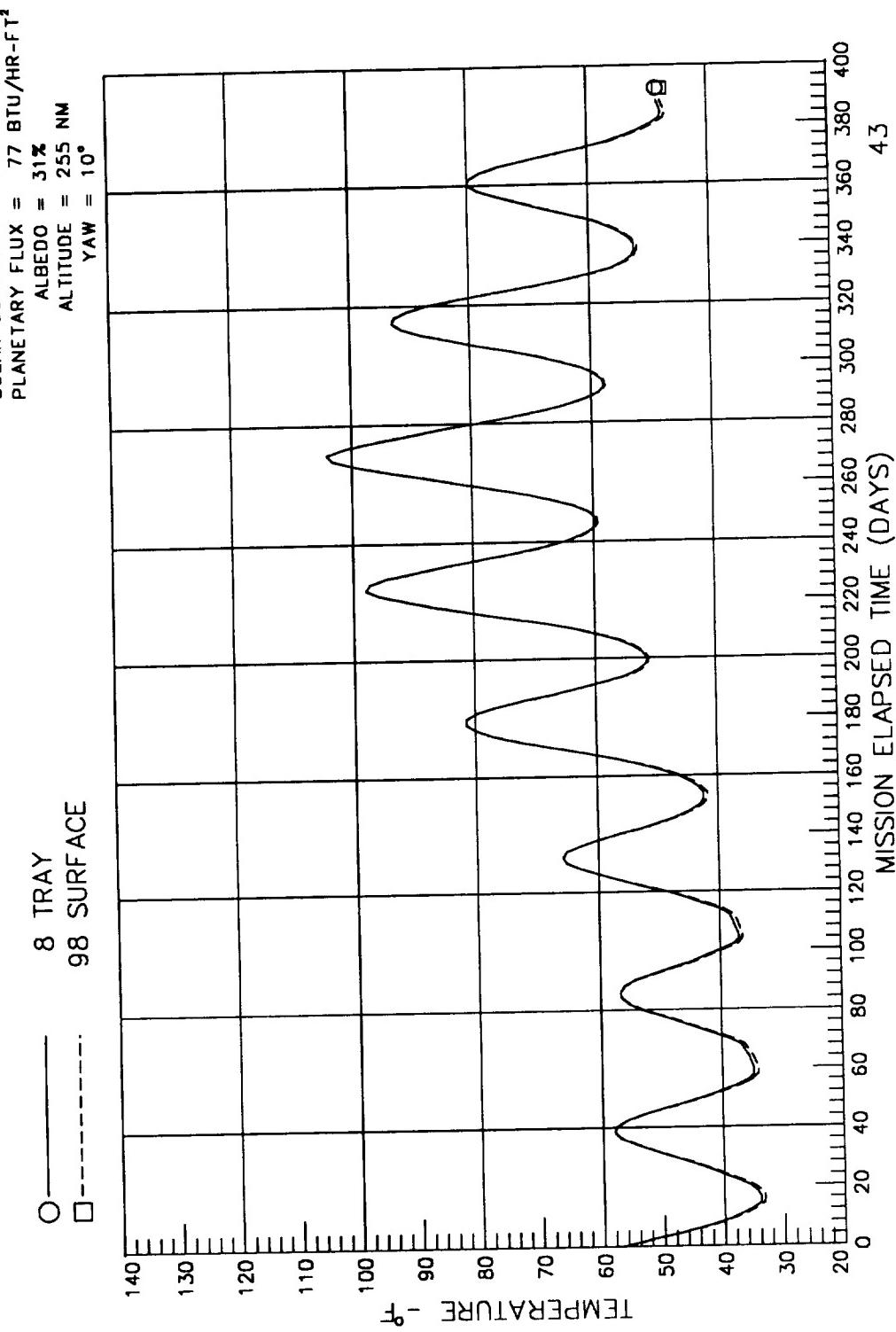
— 55 TRAY
 - - - 145 SURFACE



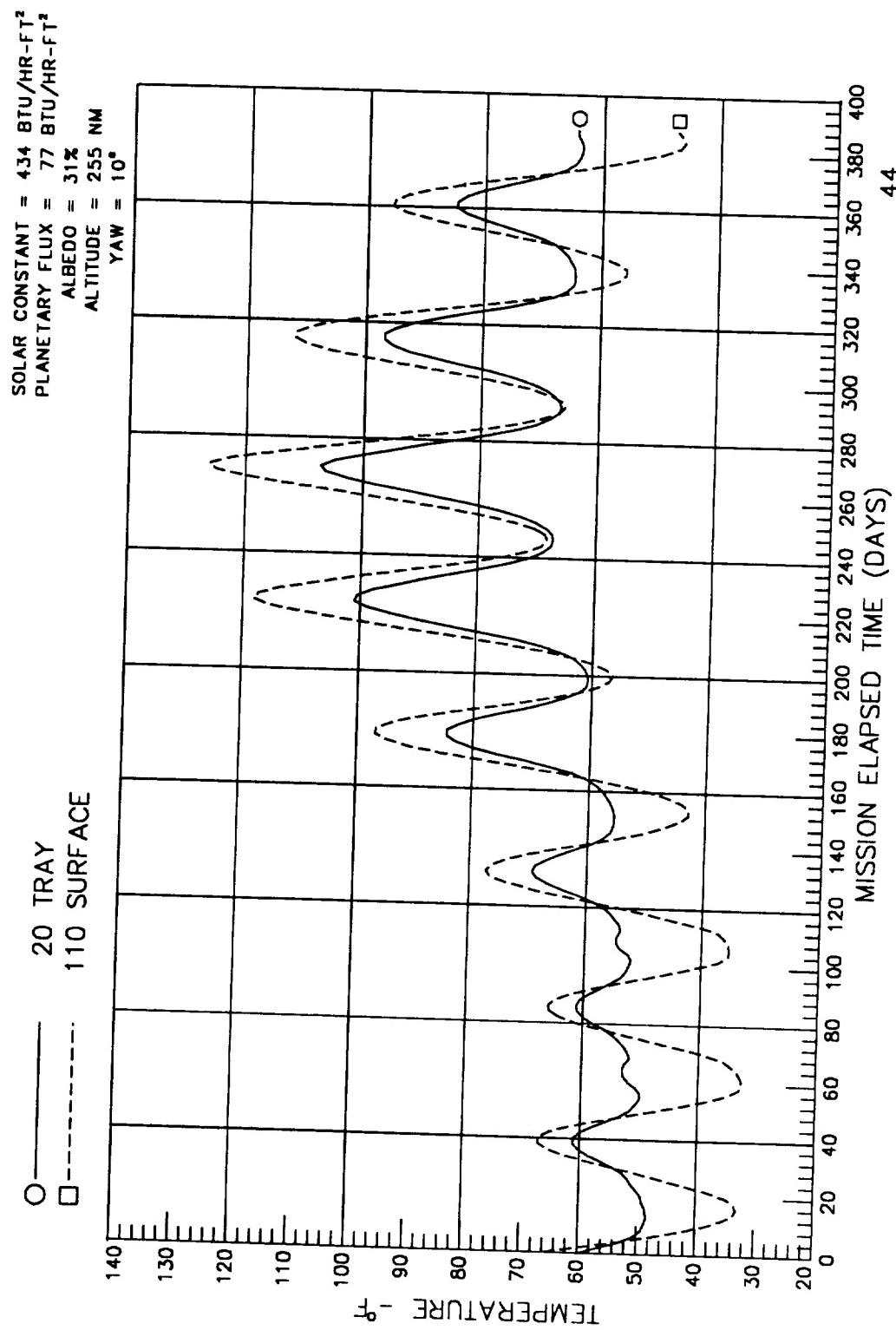
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F7



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A8



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B8

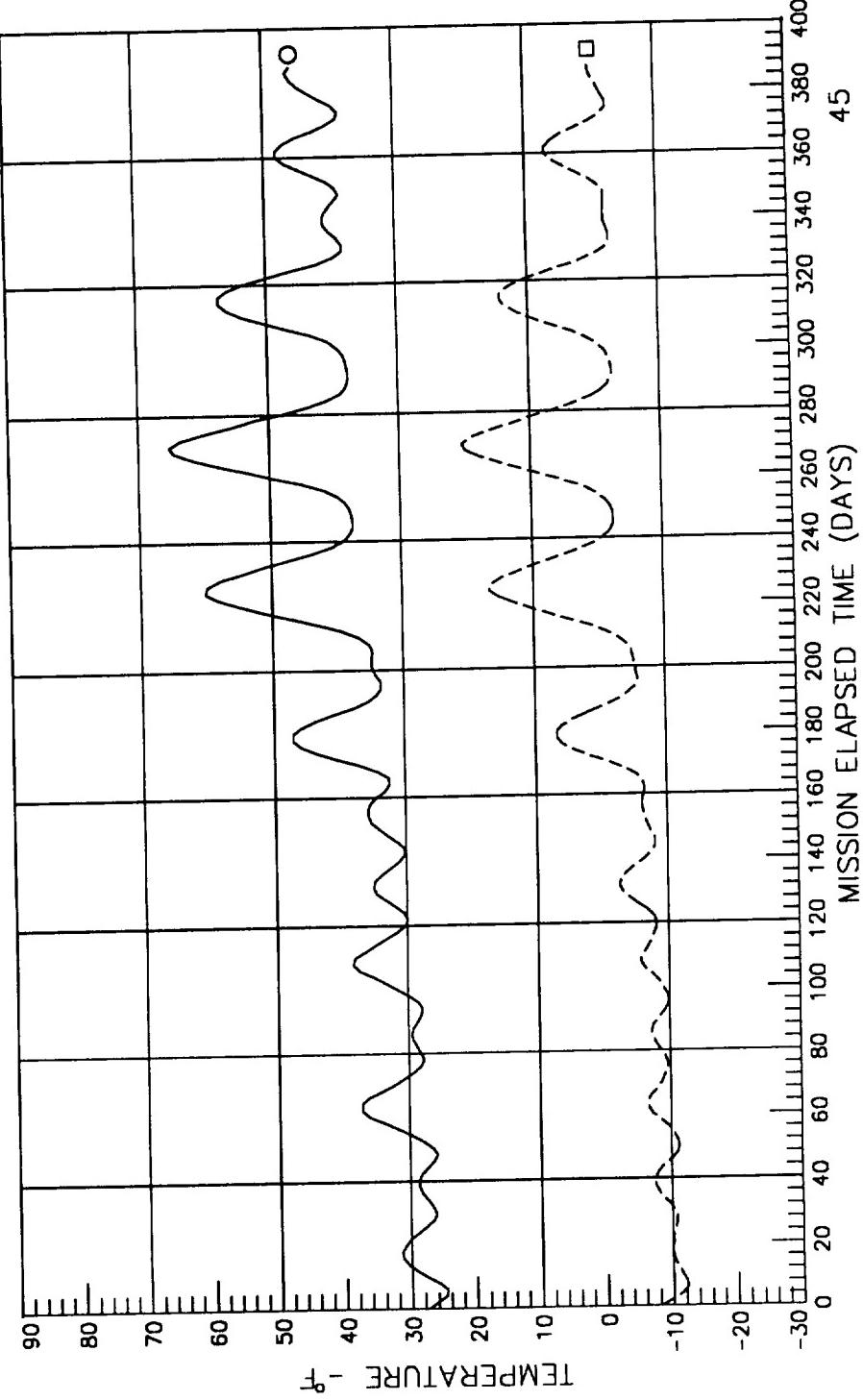


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C8

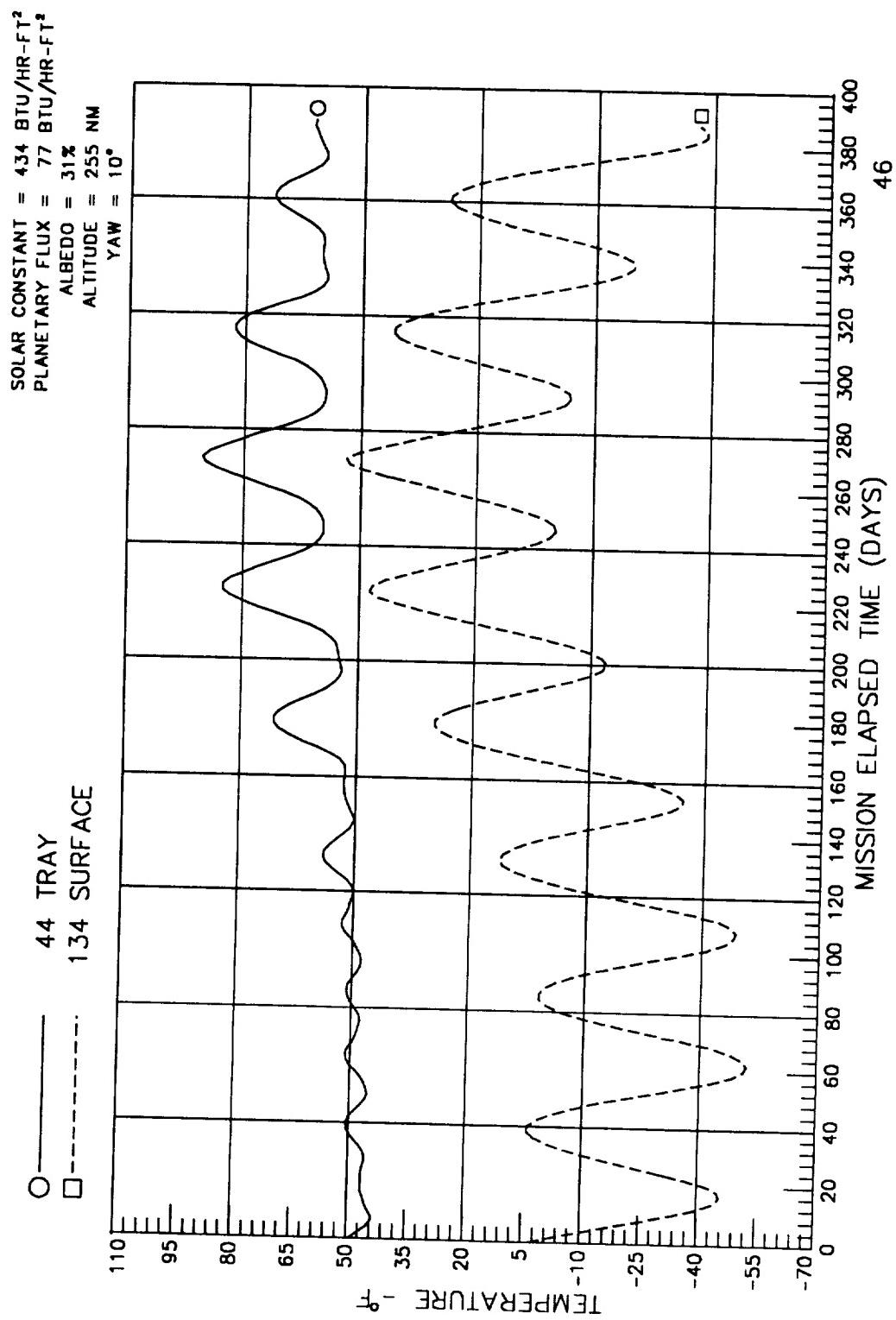
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = .31%
 ALTITUDE = 255 NM
 YAW = 10°

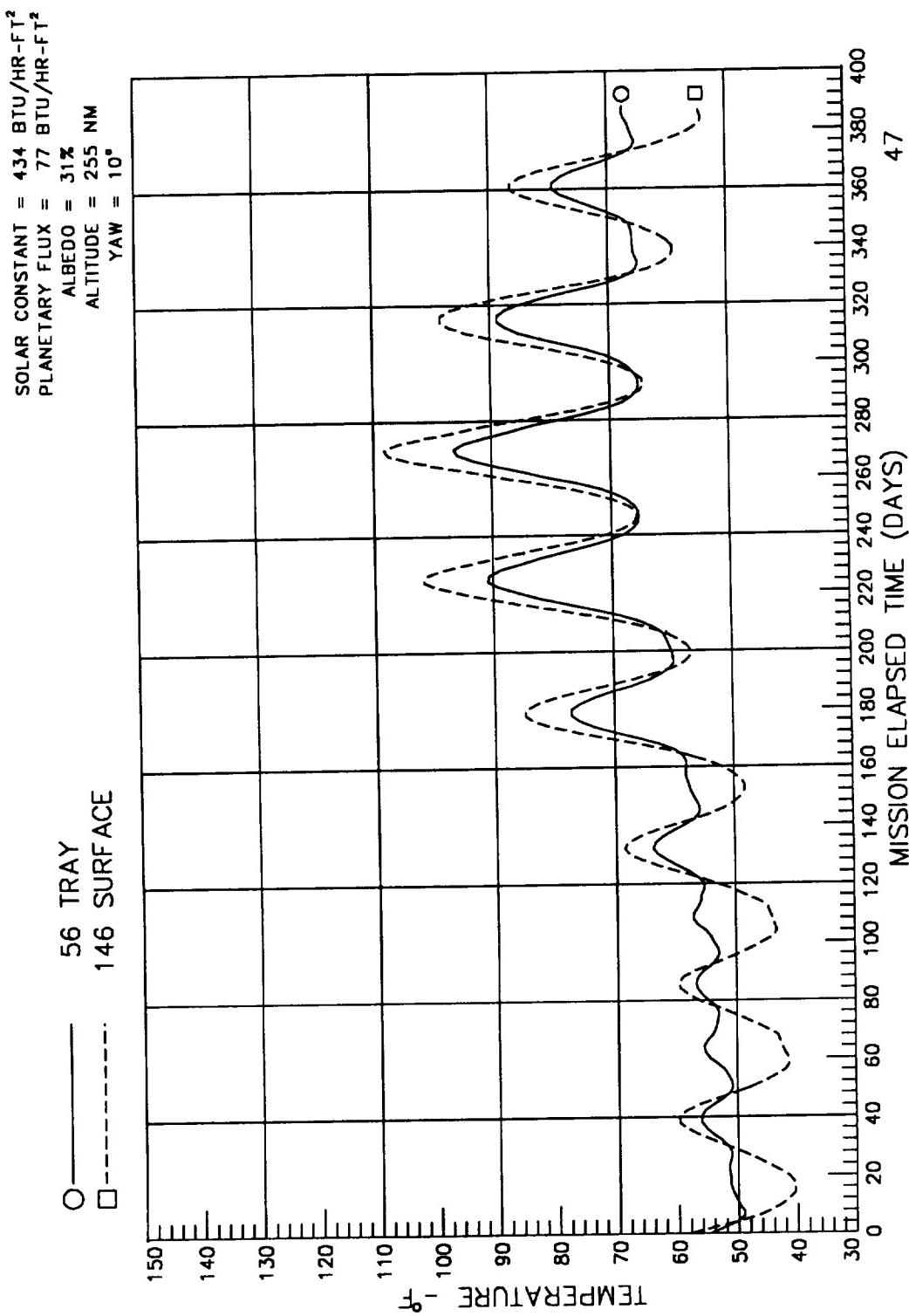
— 32 TRAY
 - - - 122 SURFACE



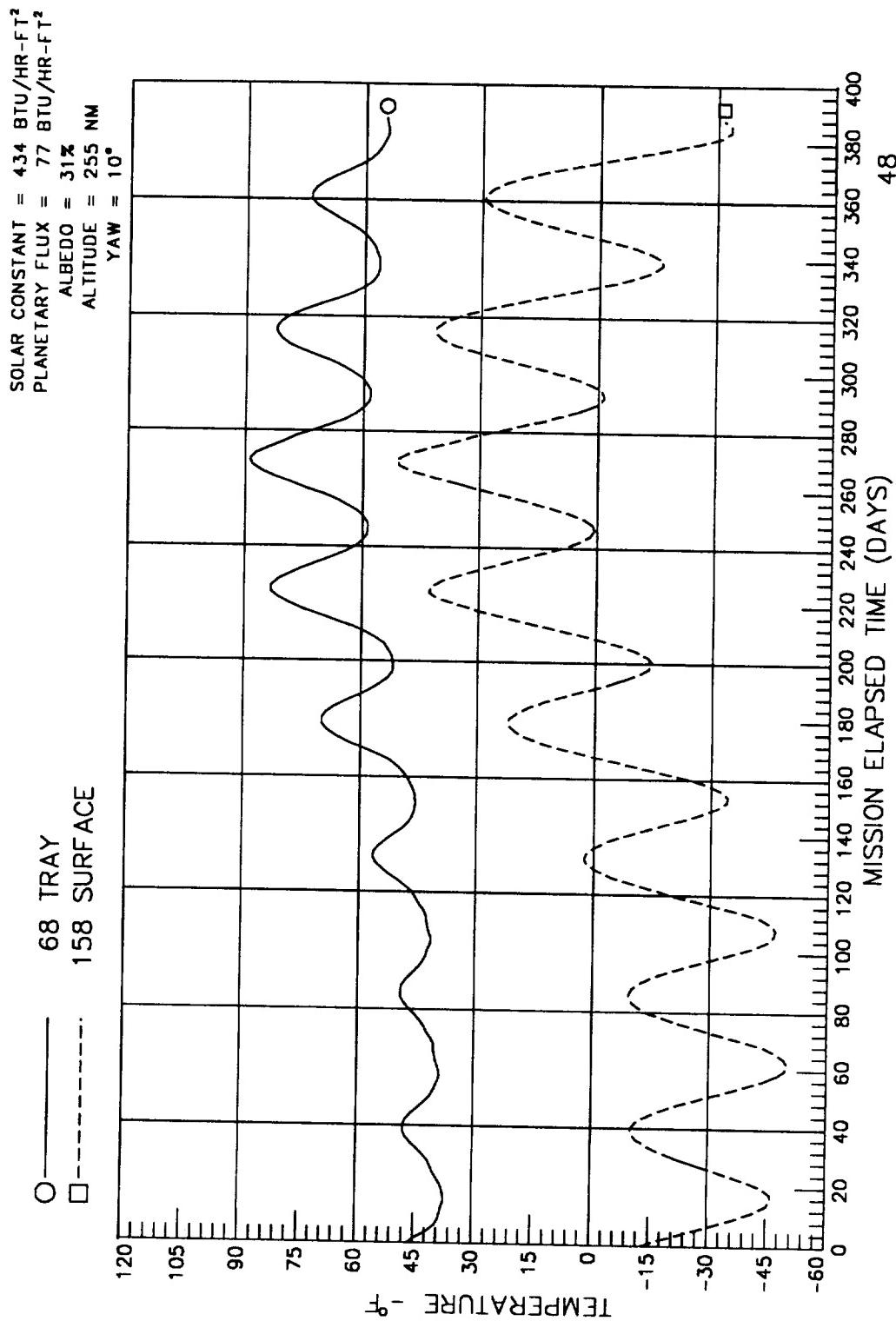
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D8



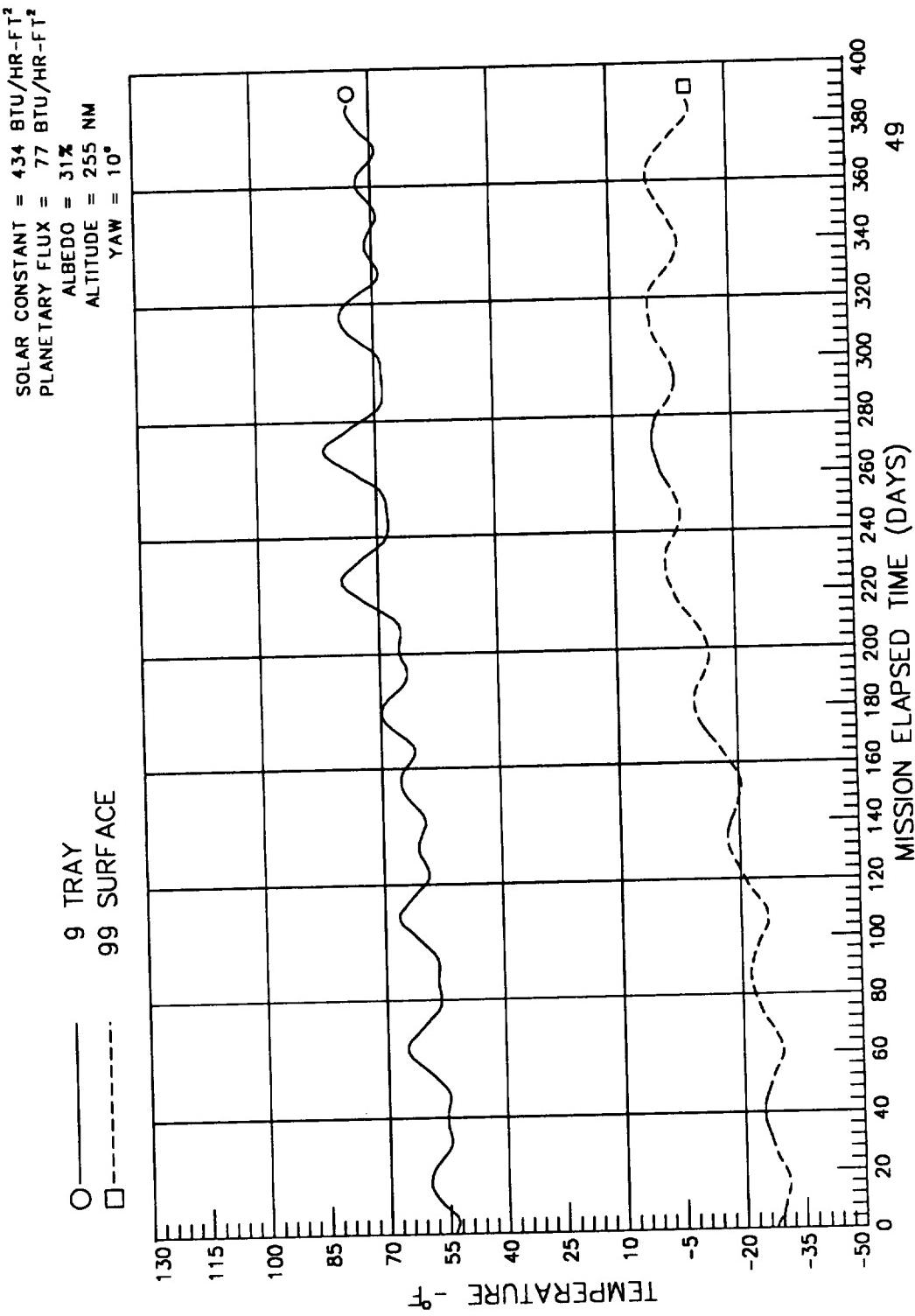
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E8



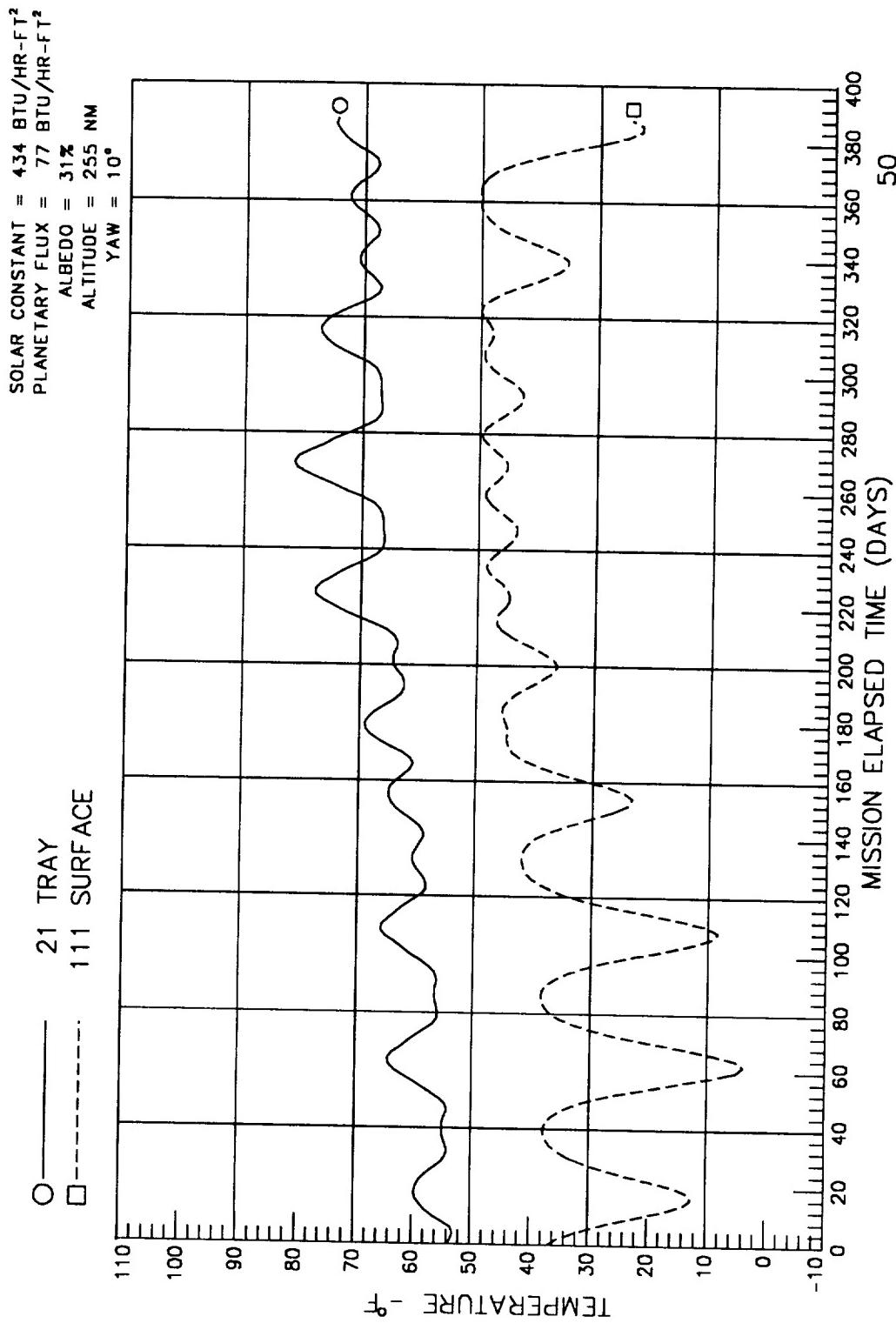
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F8



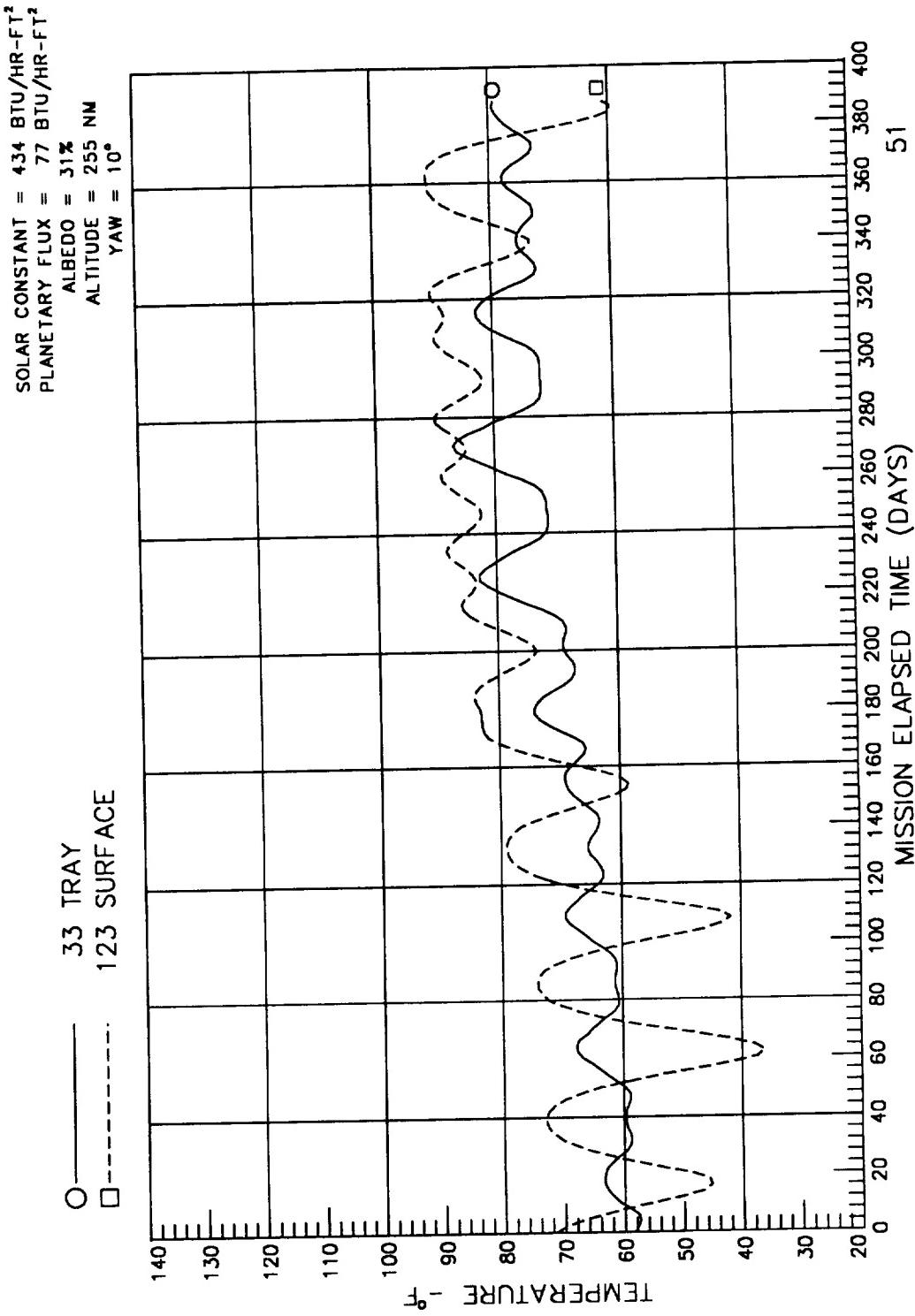
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A9



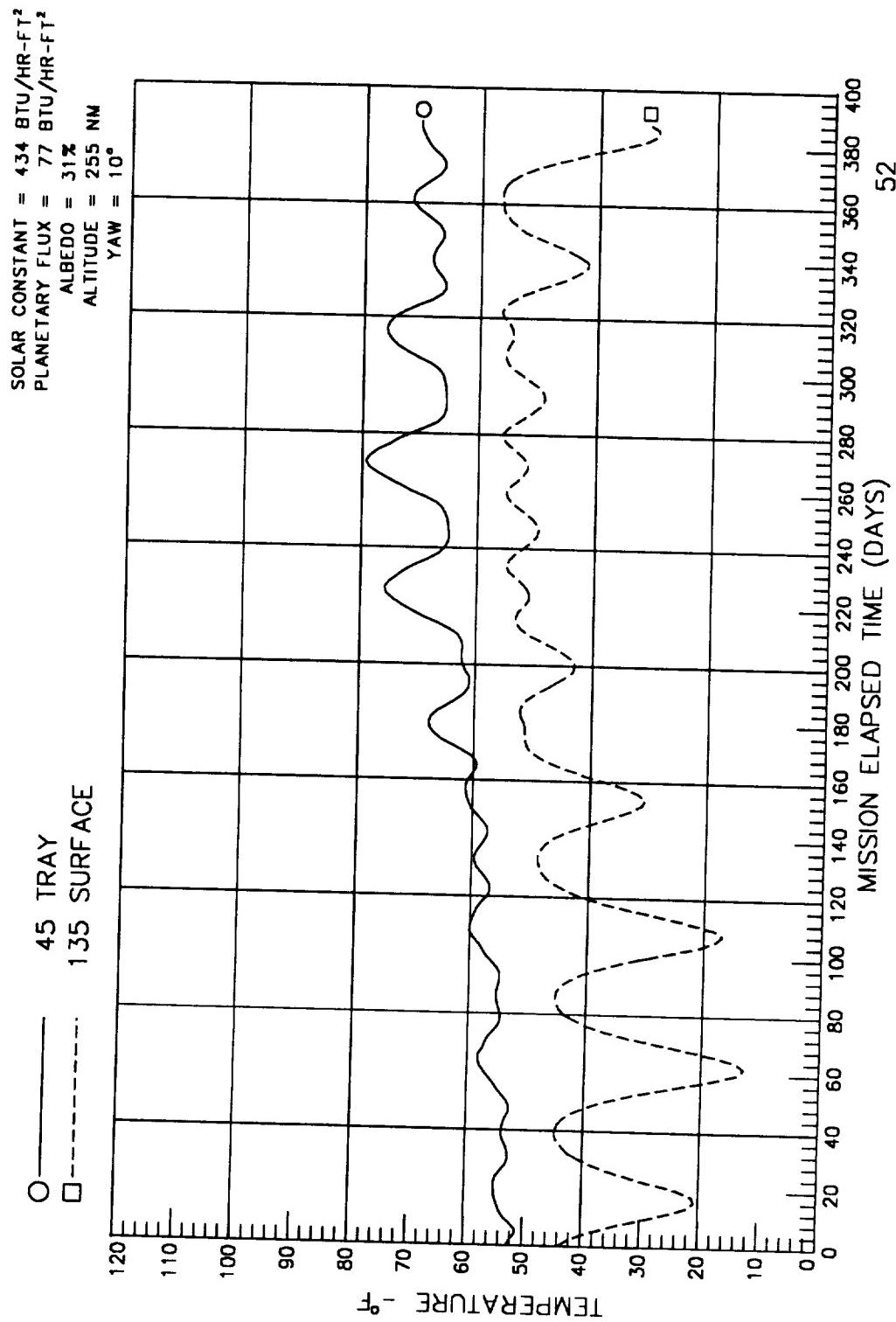
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B9



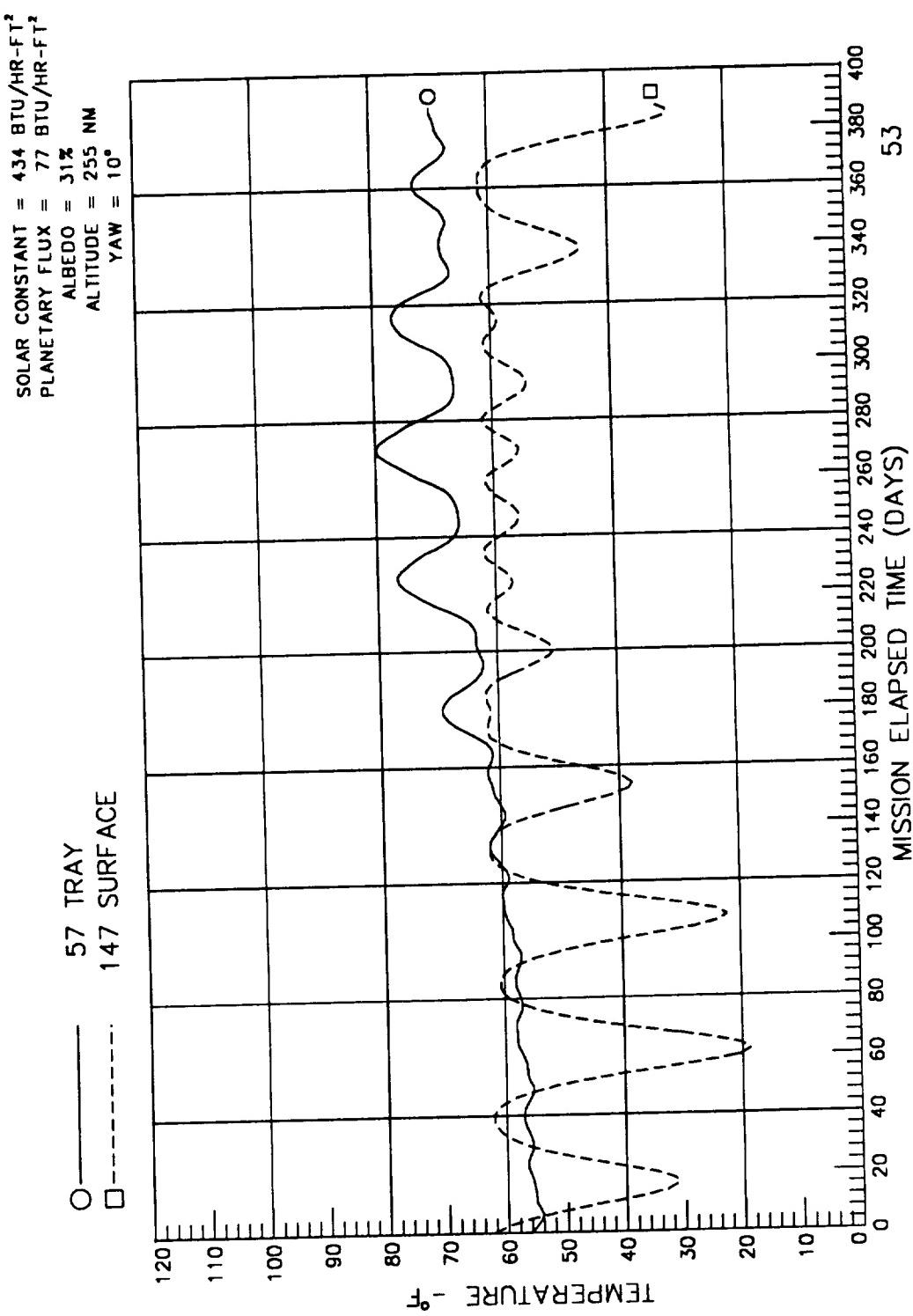
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C9



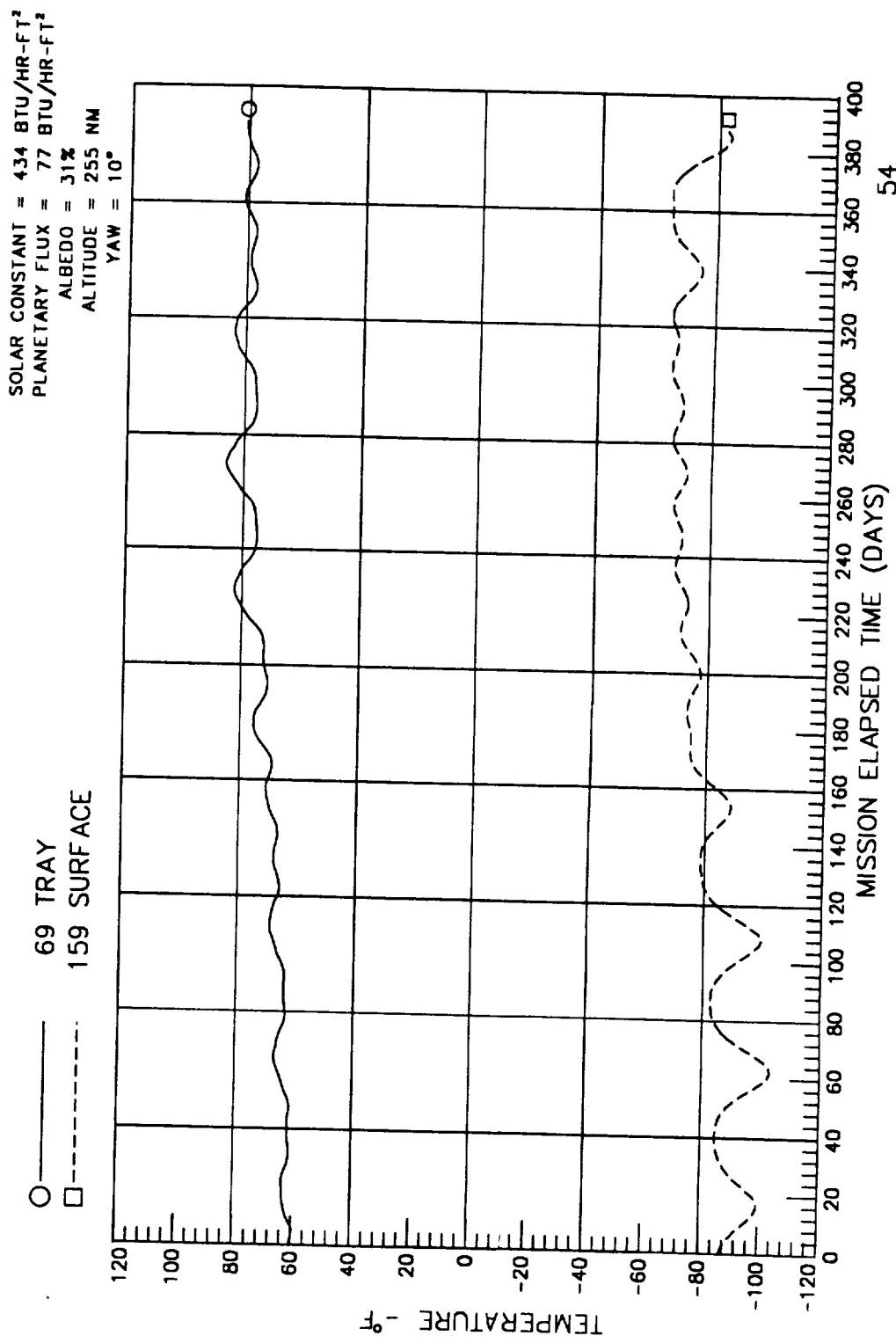
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D9



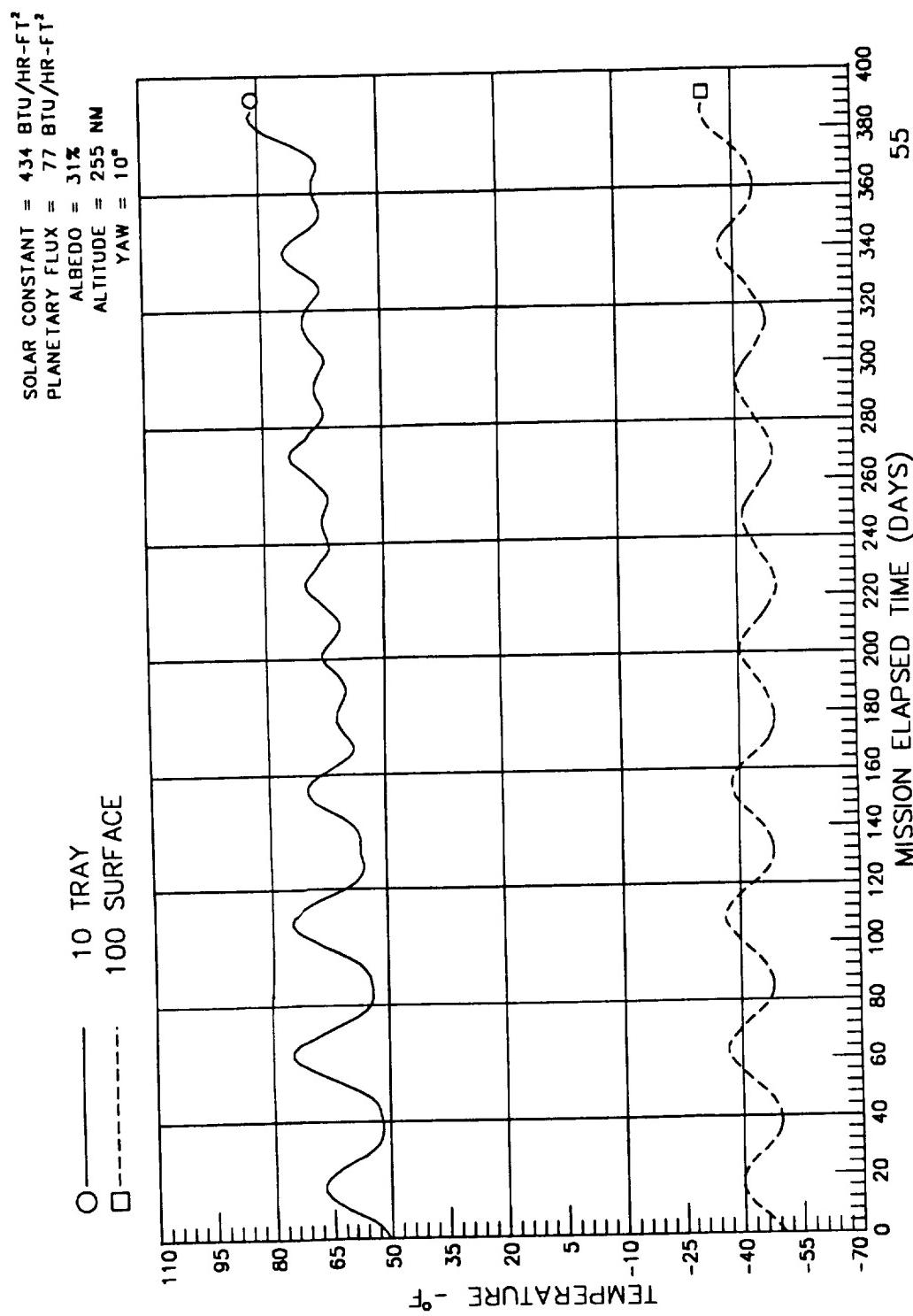
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
LOCATION: E9



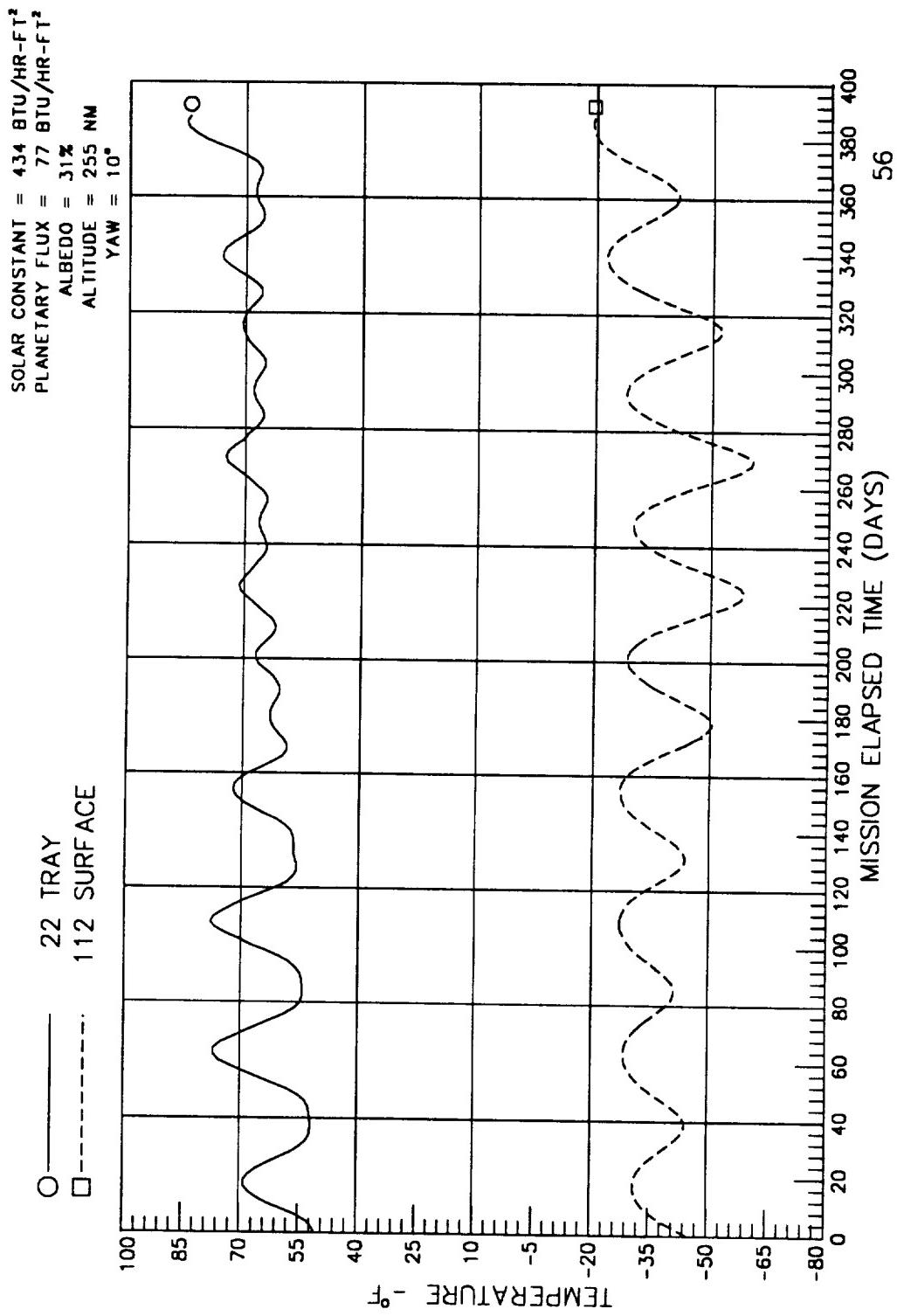
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F9



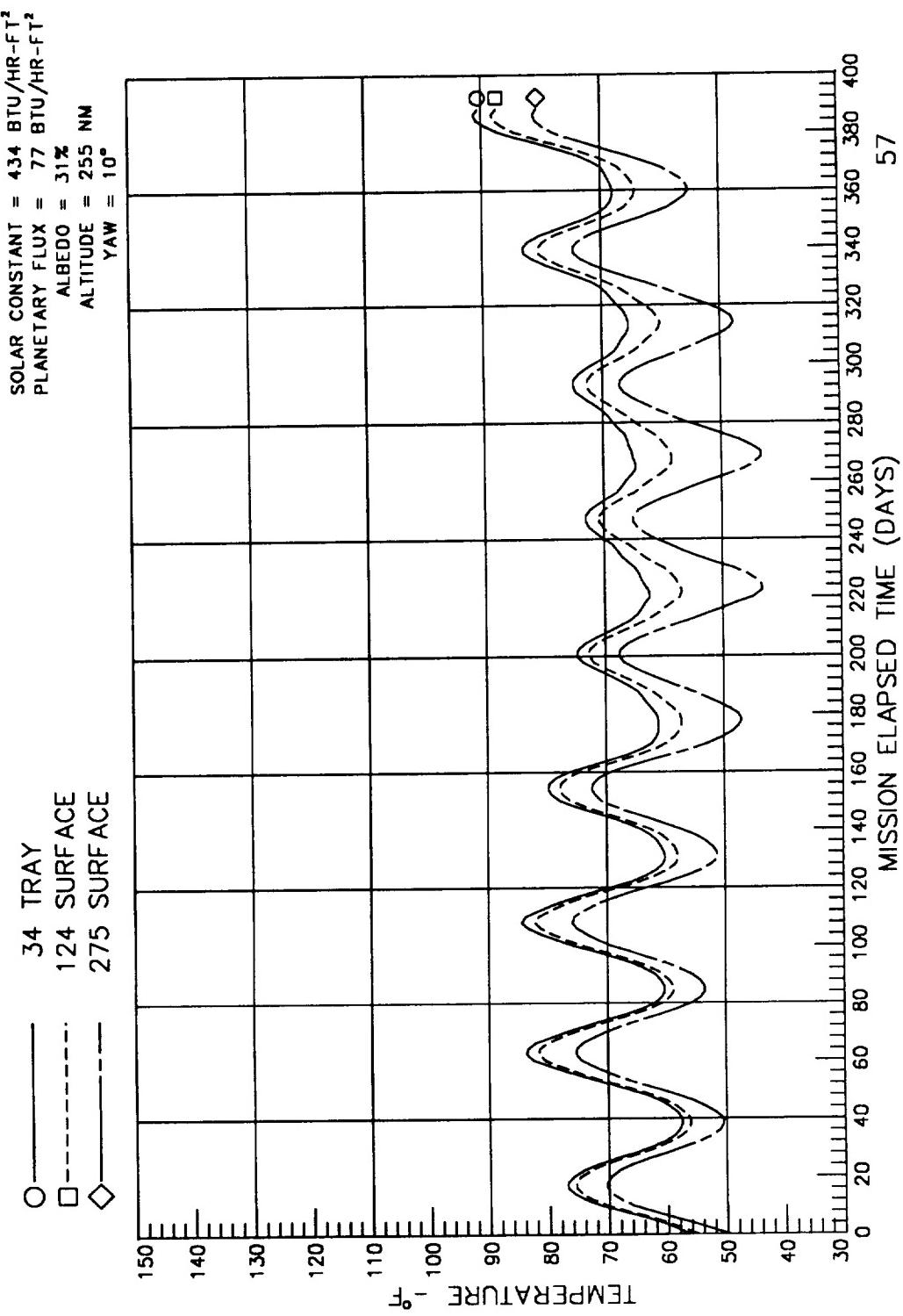
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A10



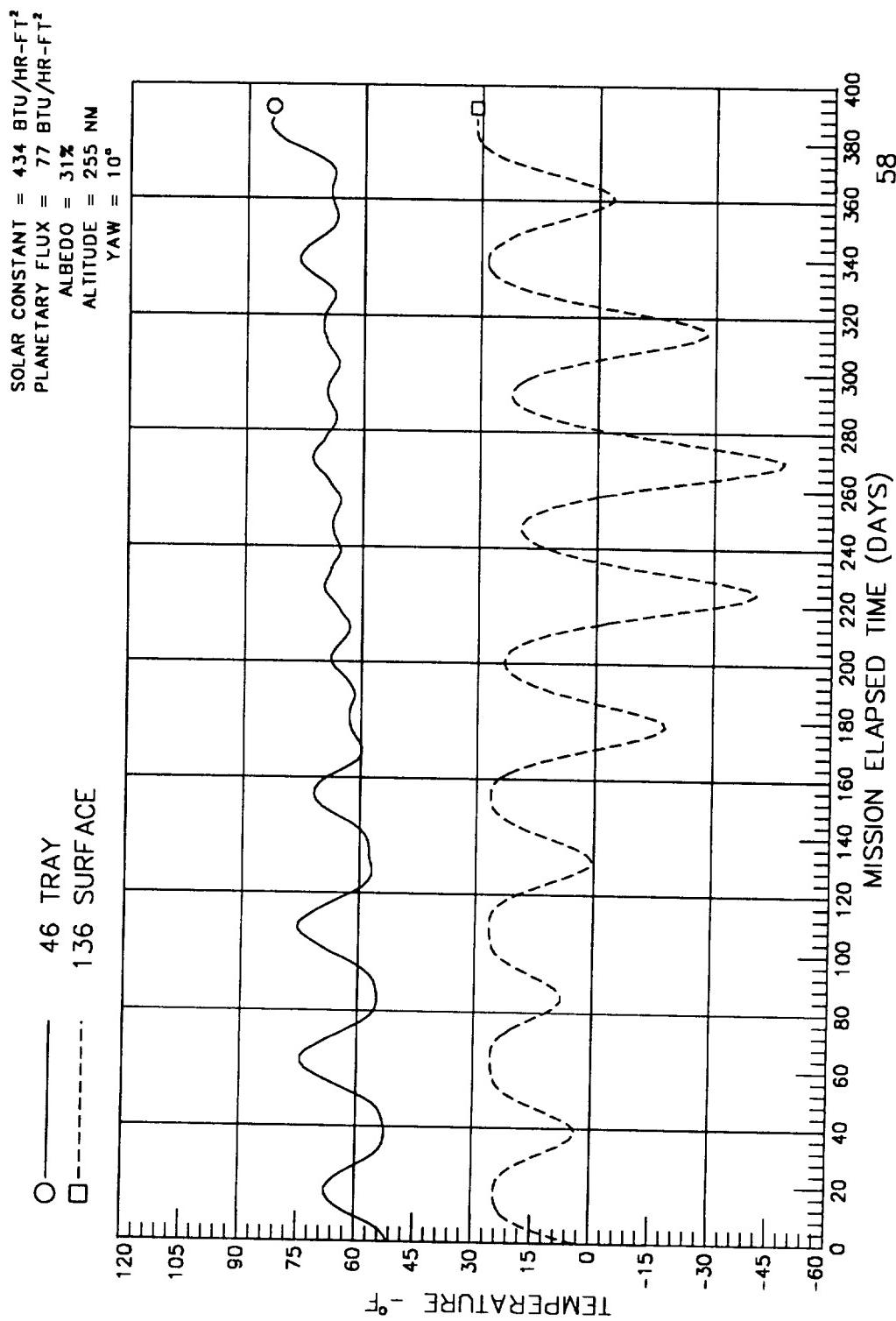
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B10



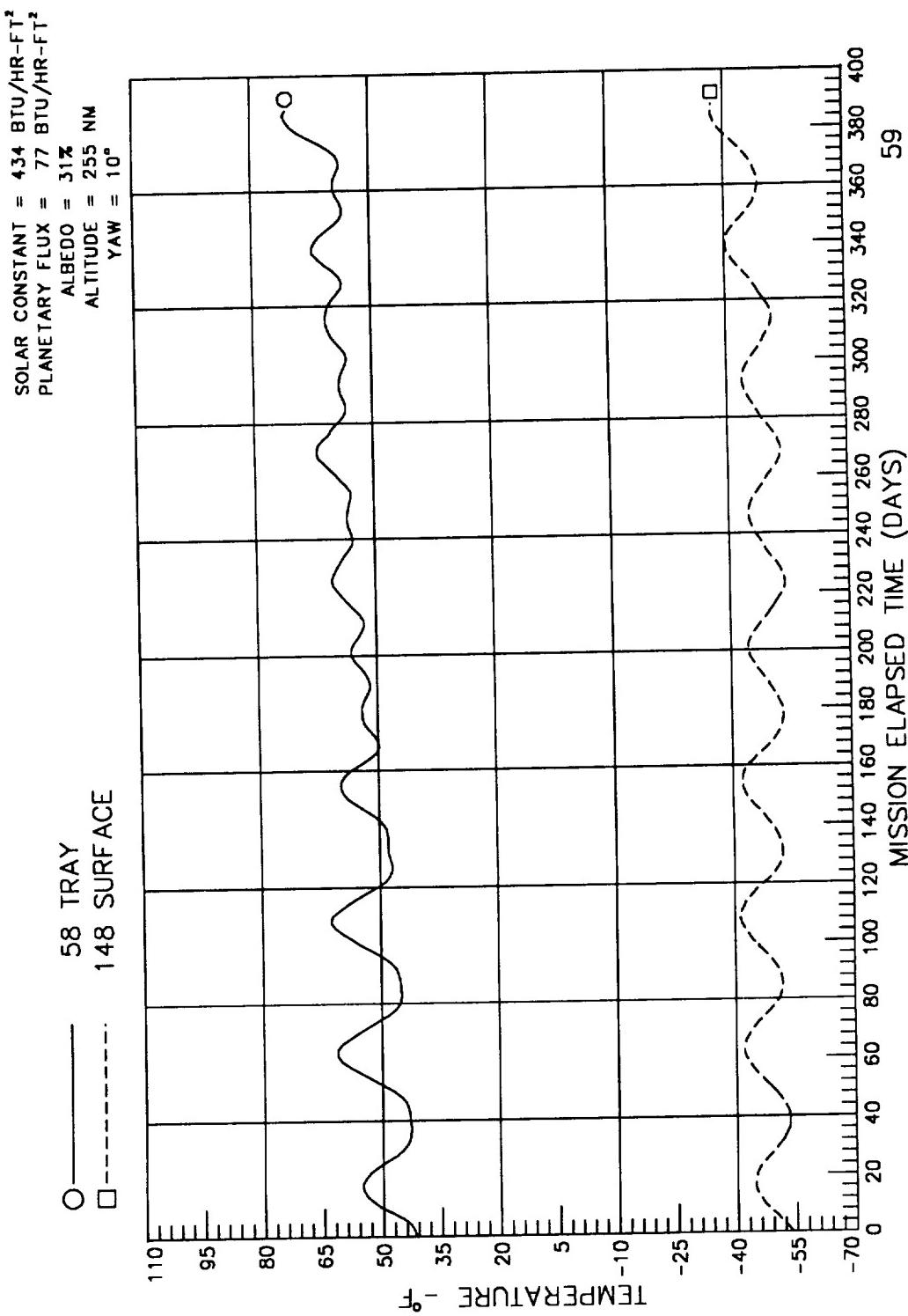
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C10



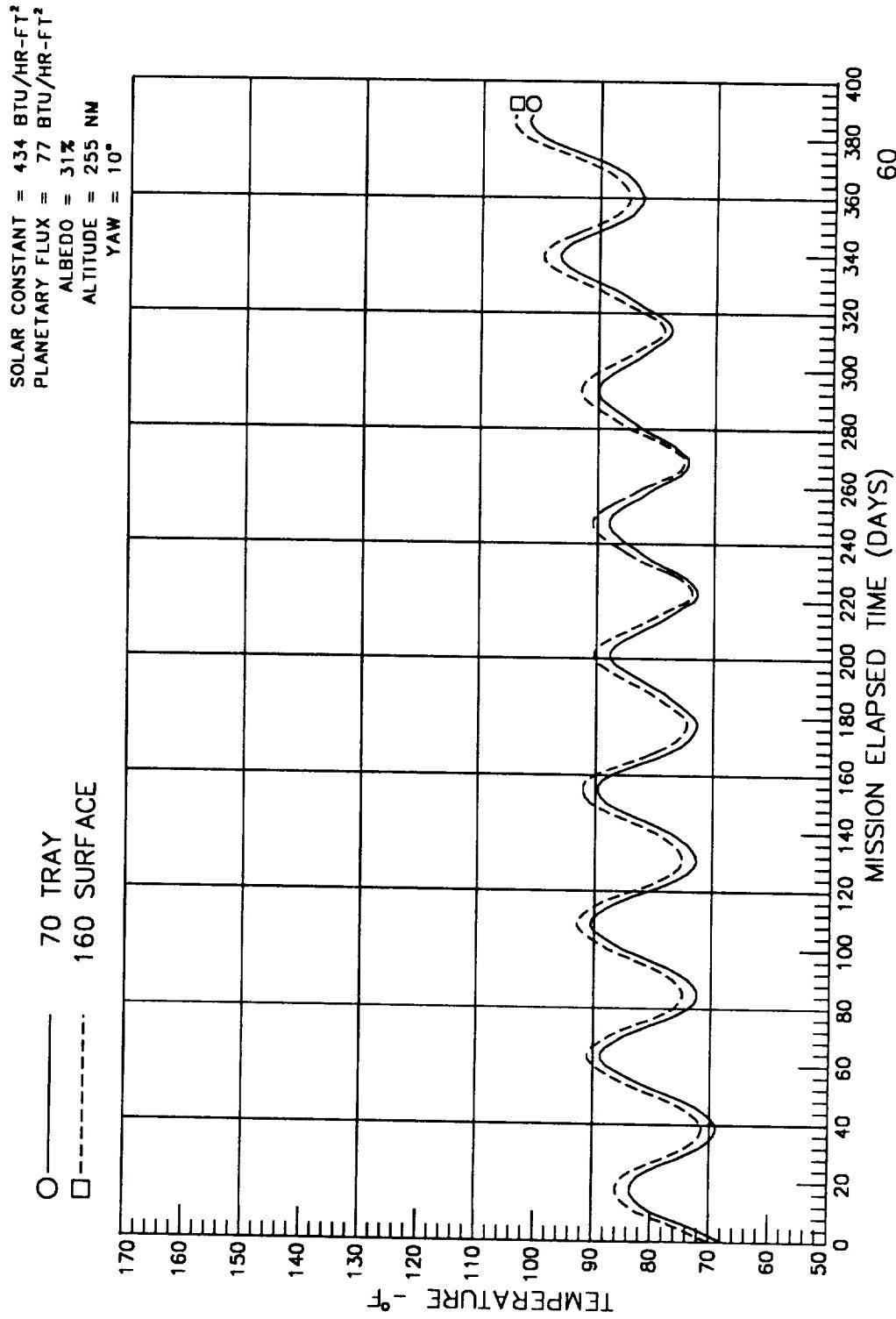
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D10



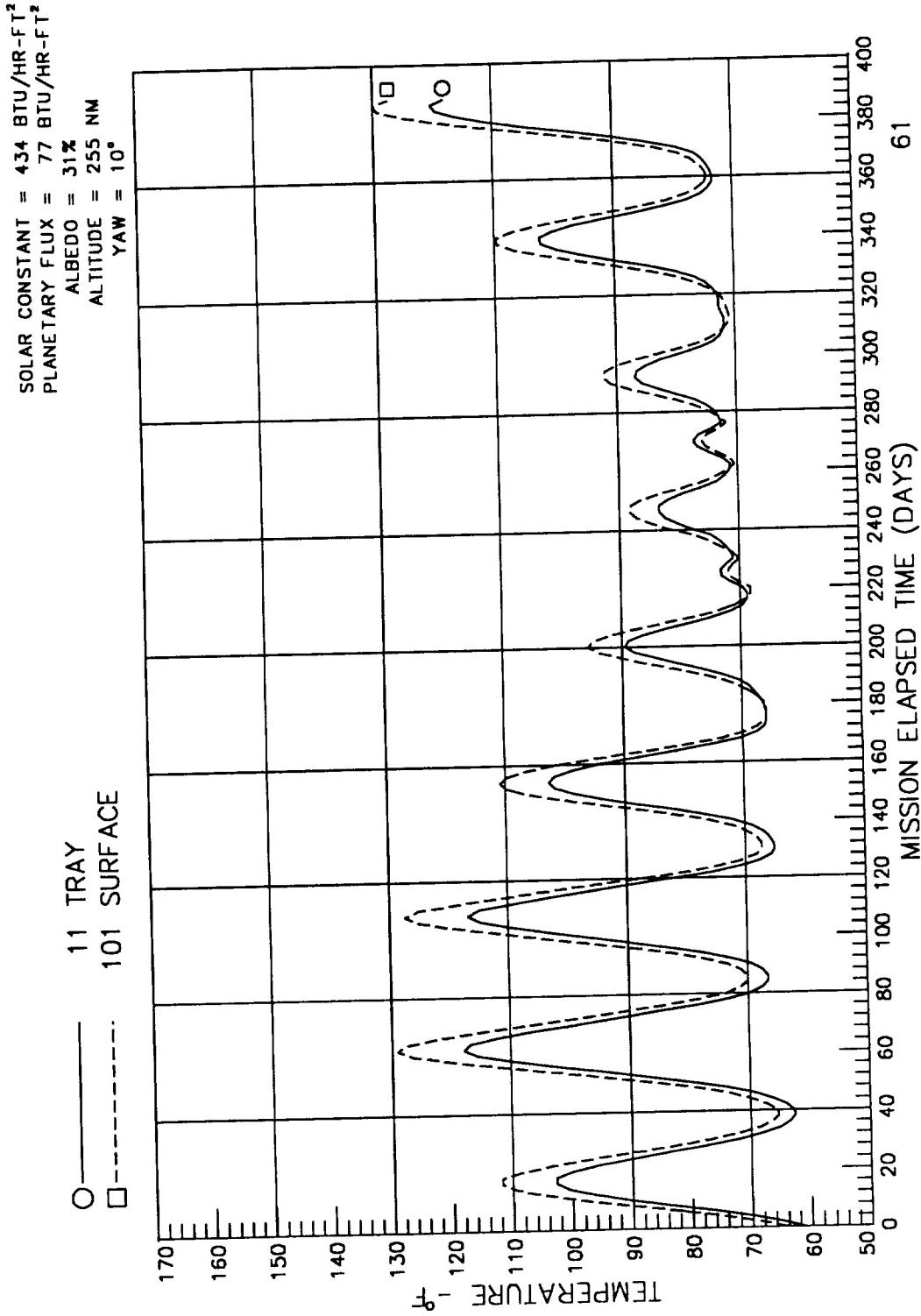
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E10



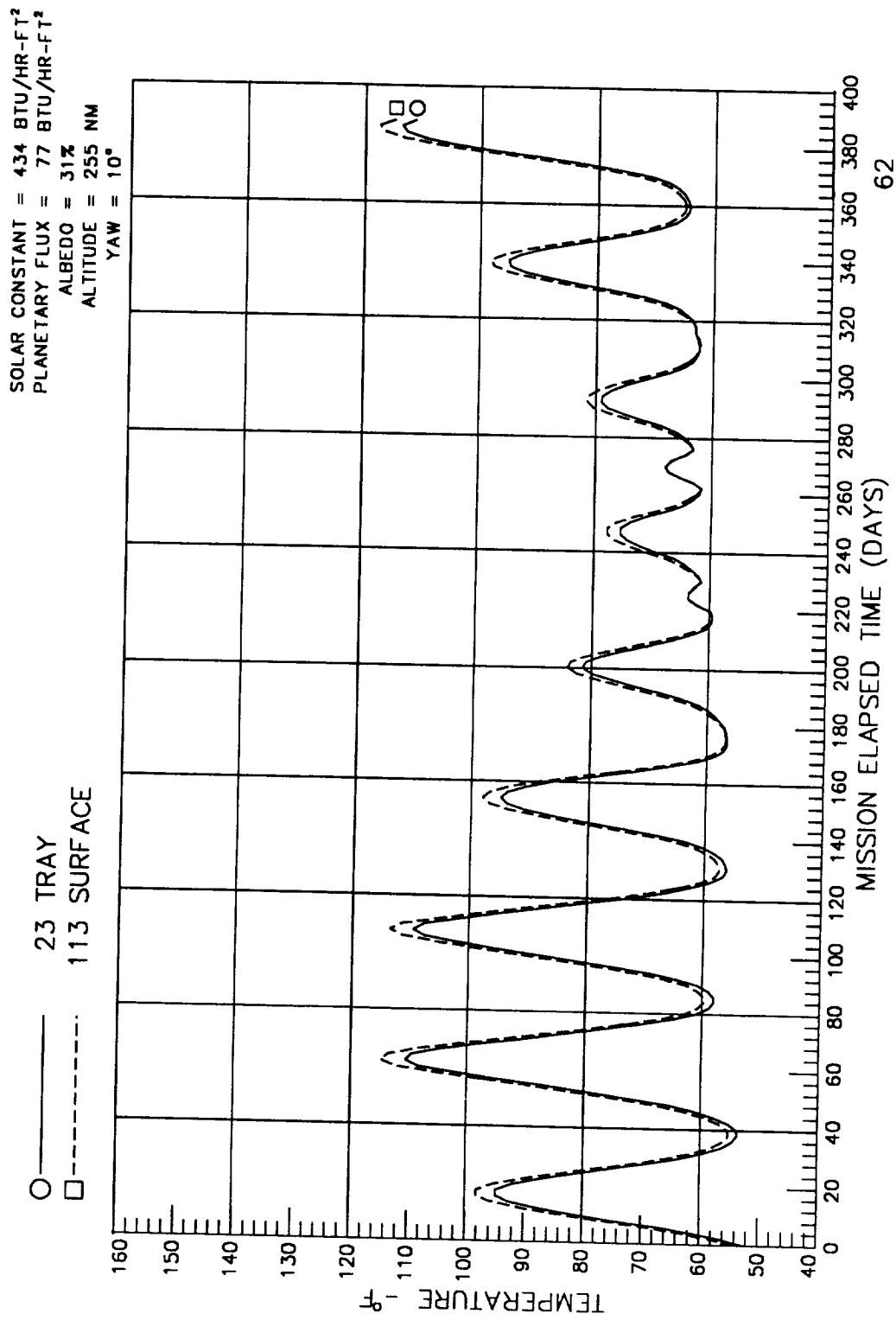
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F10



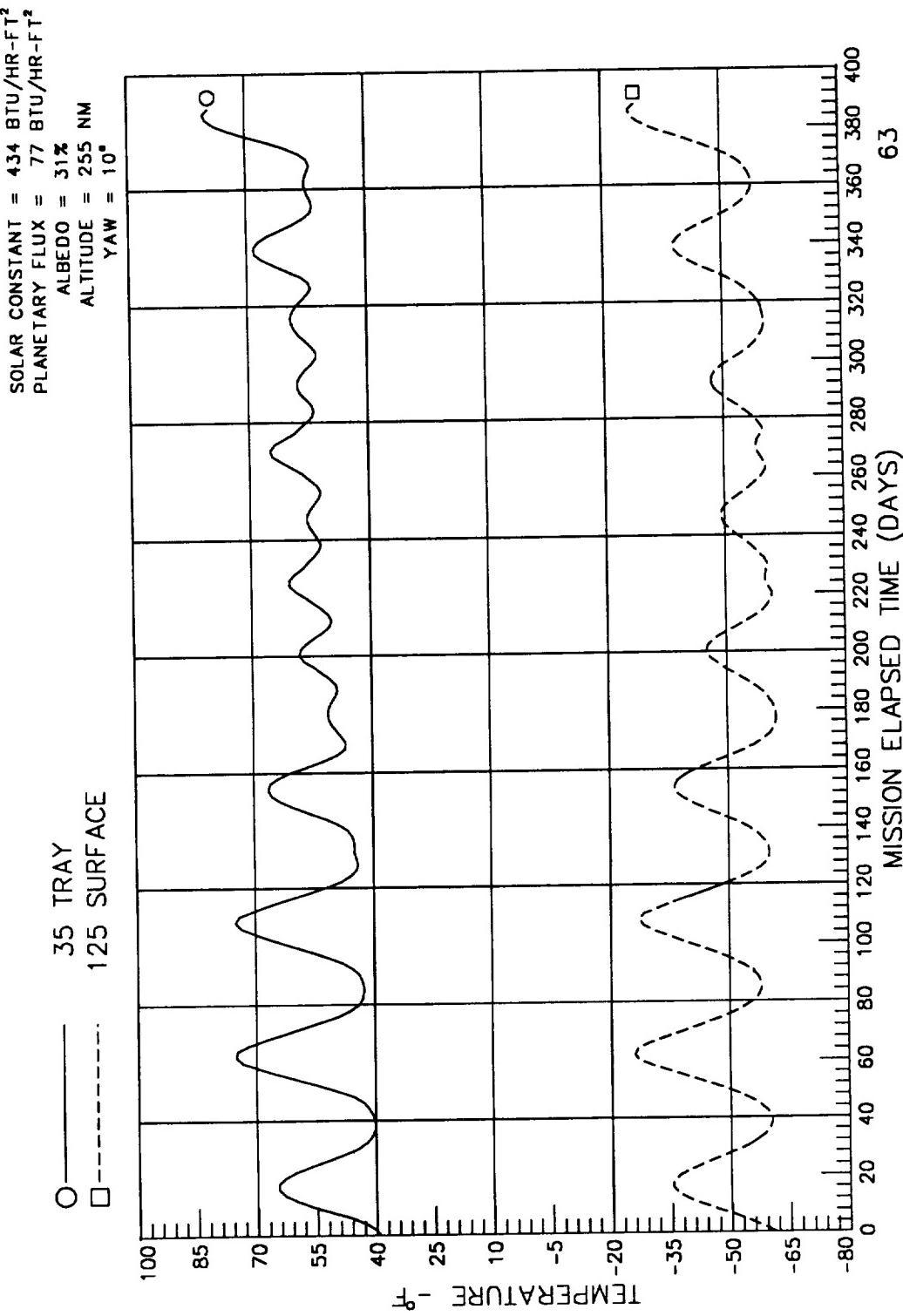
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A11



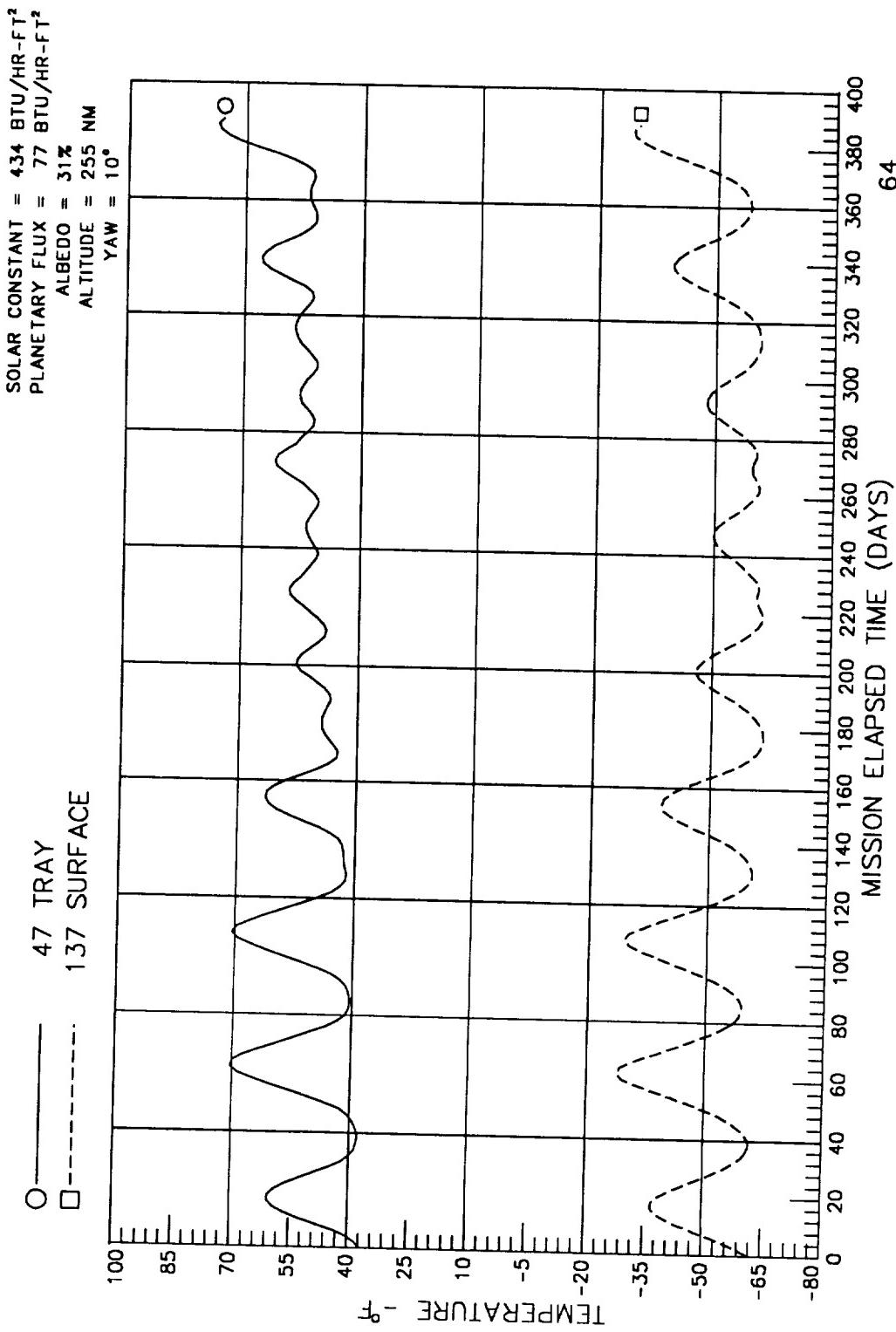
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B11



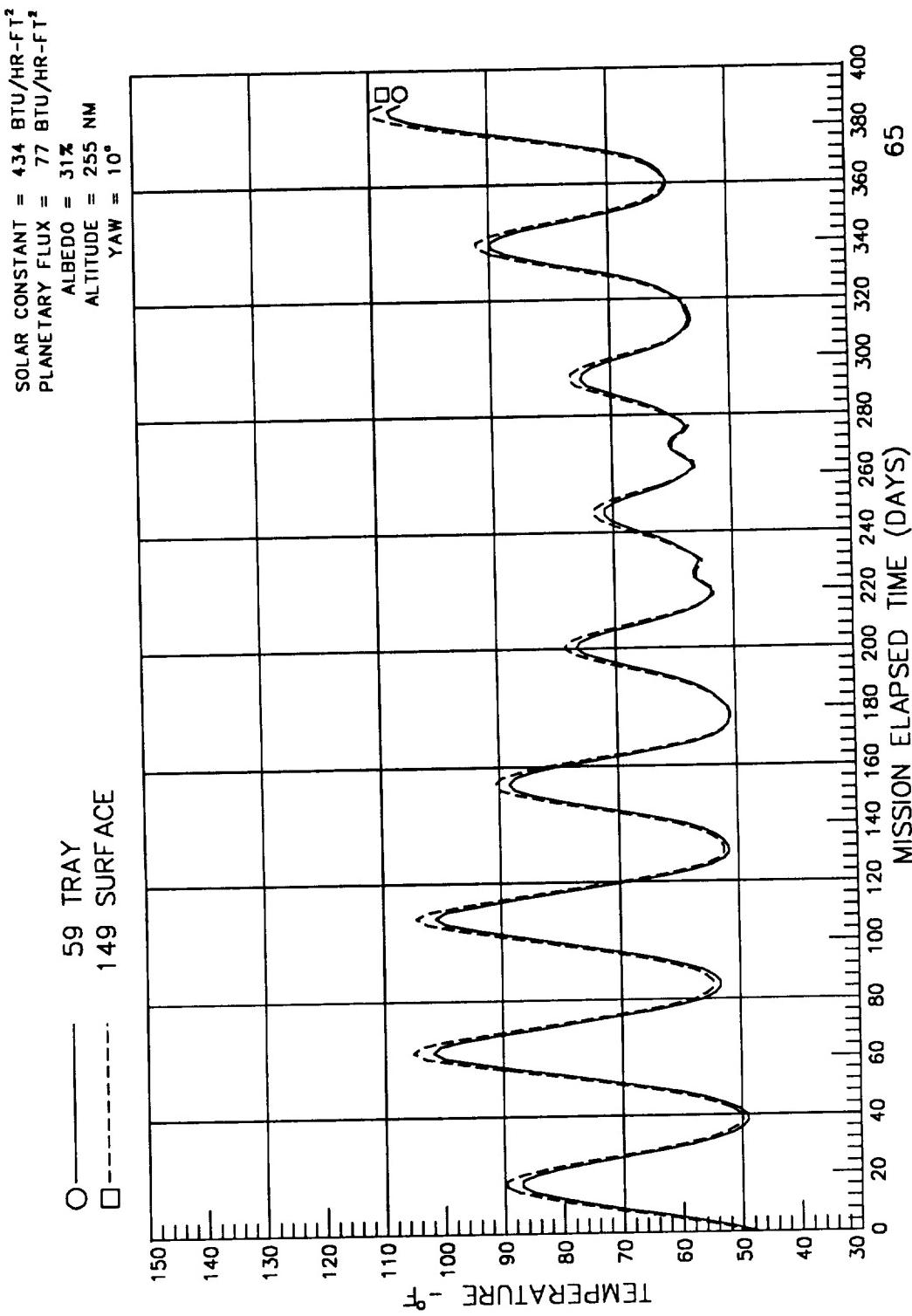
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C11



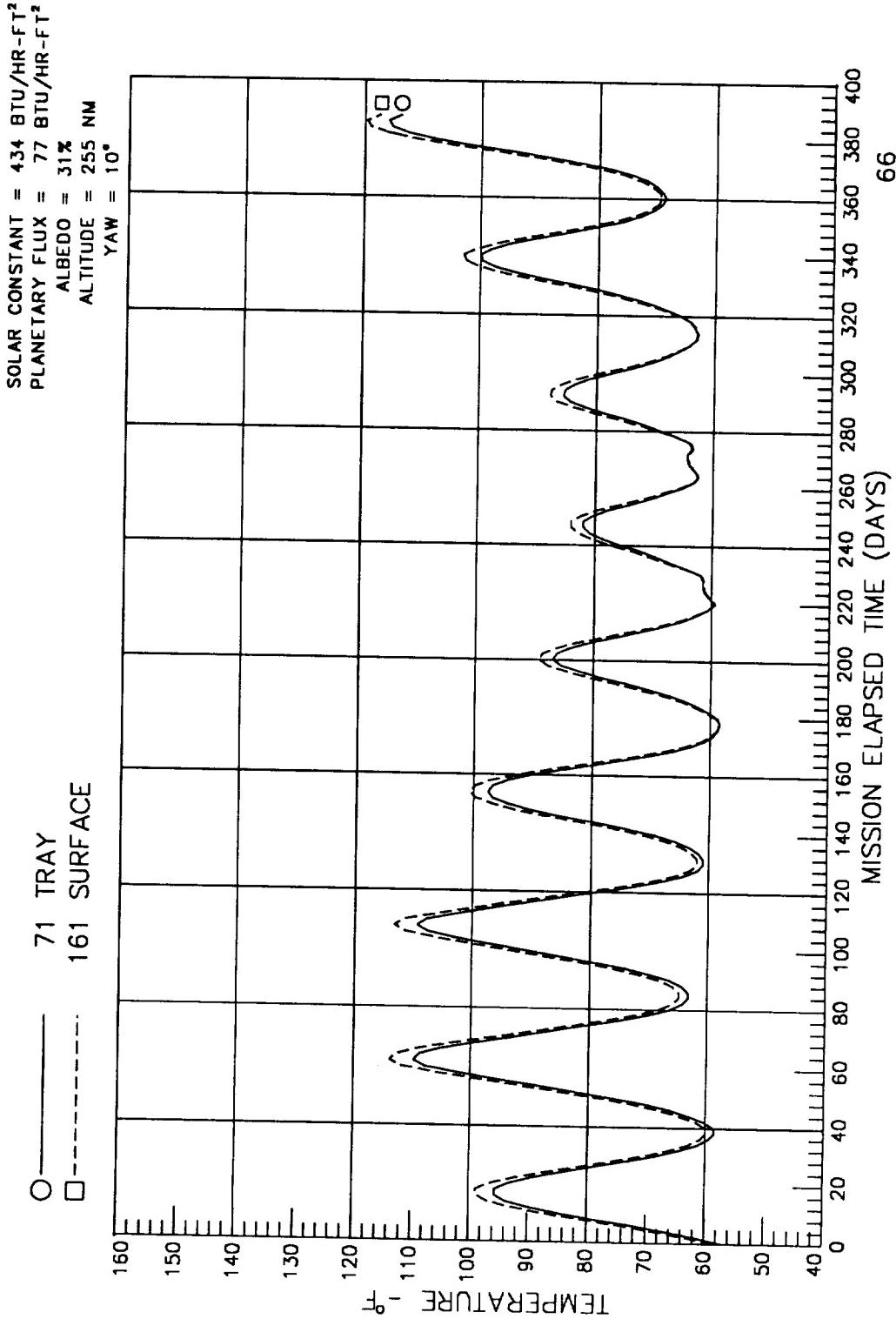
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: D11



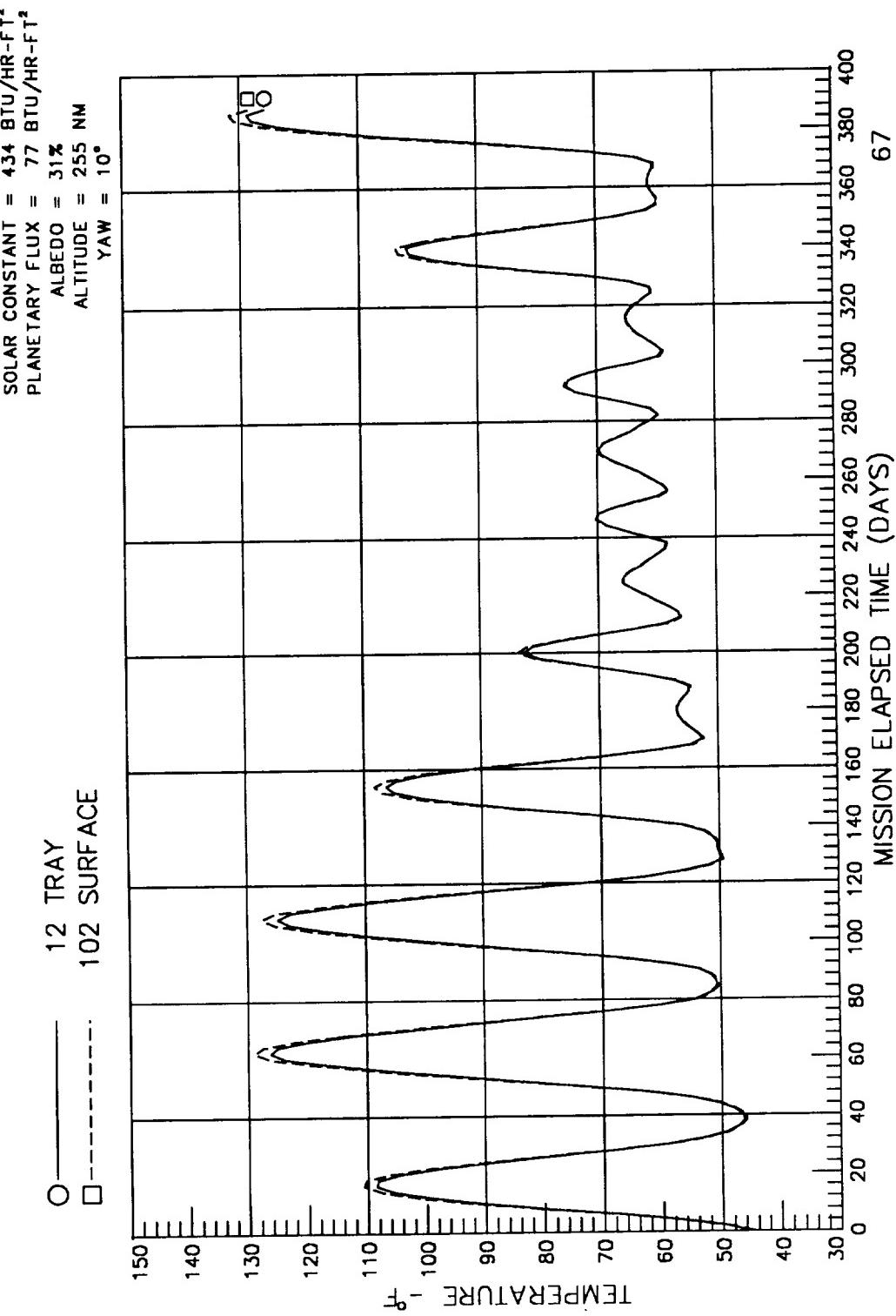
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E11



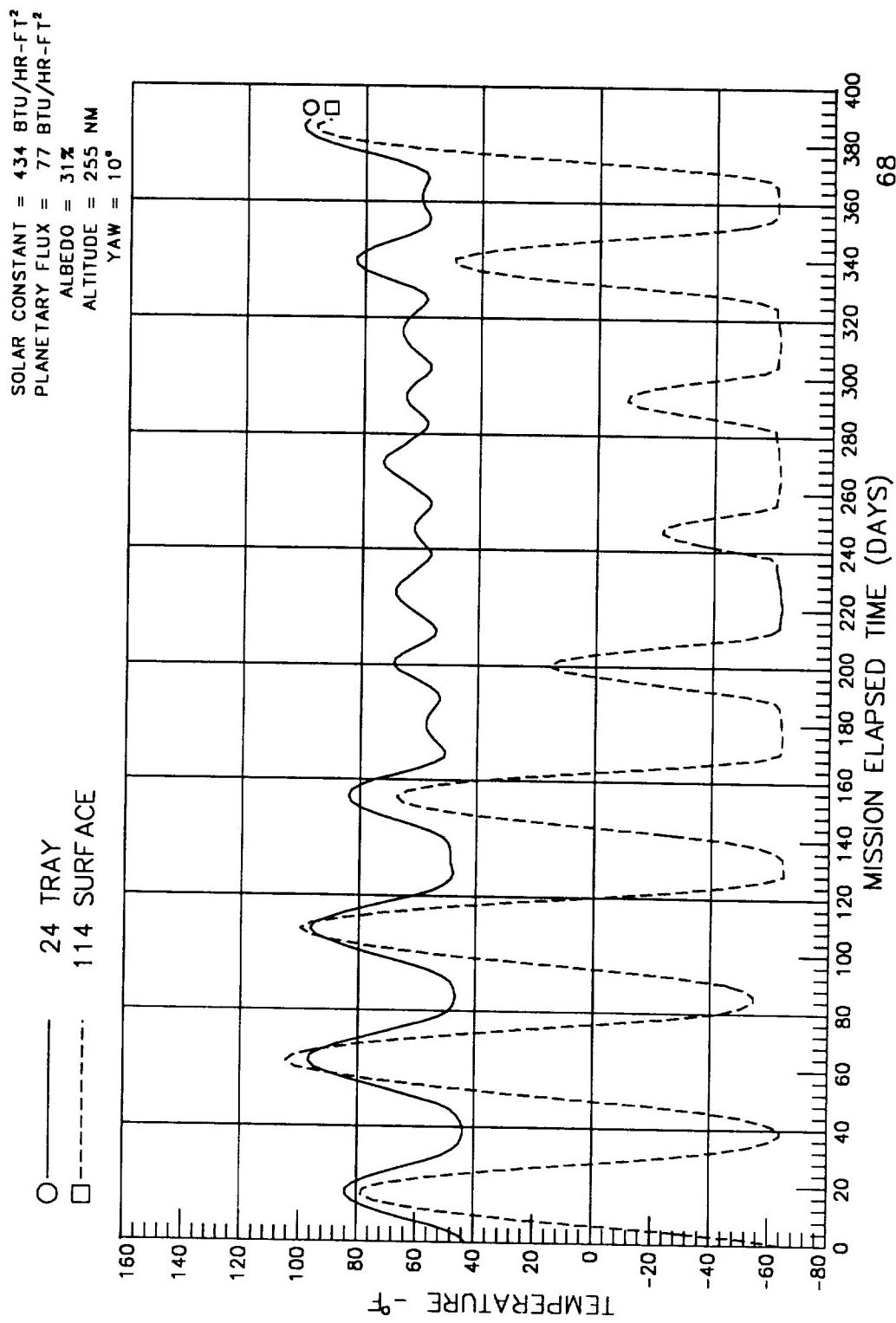
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F11



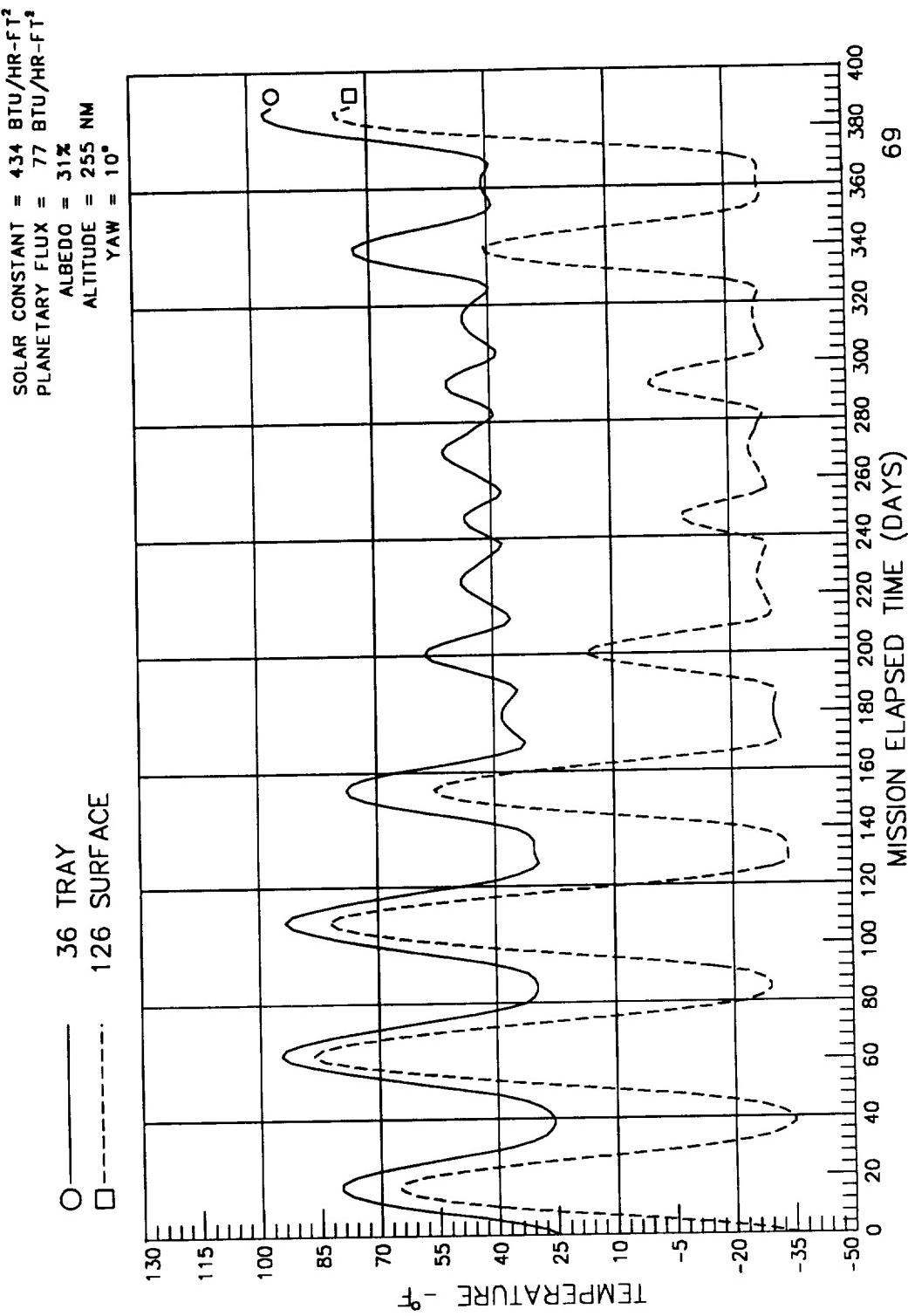
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: A12



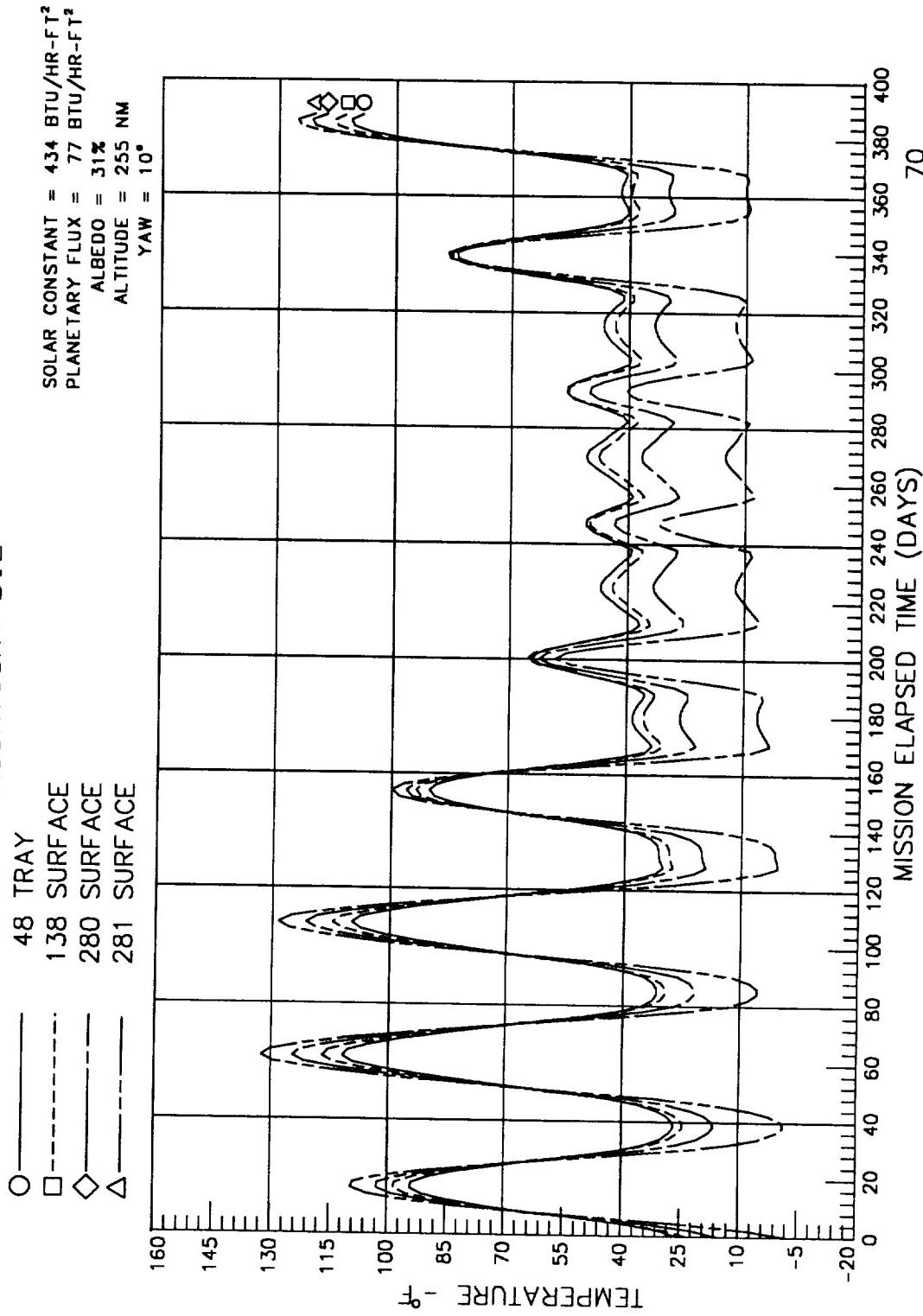
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: B12



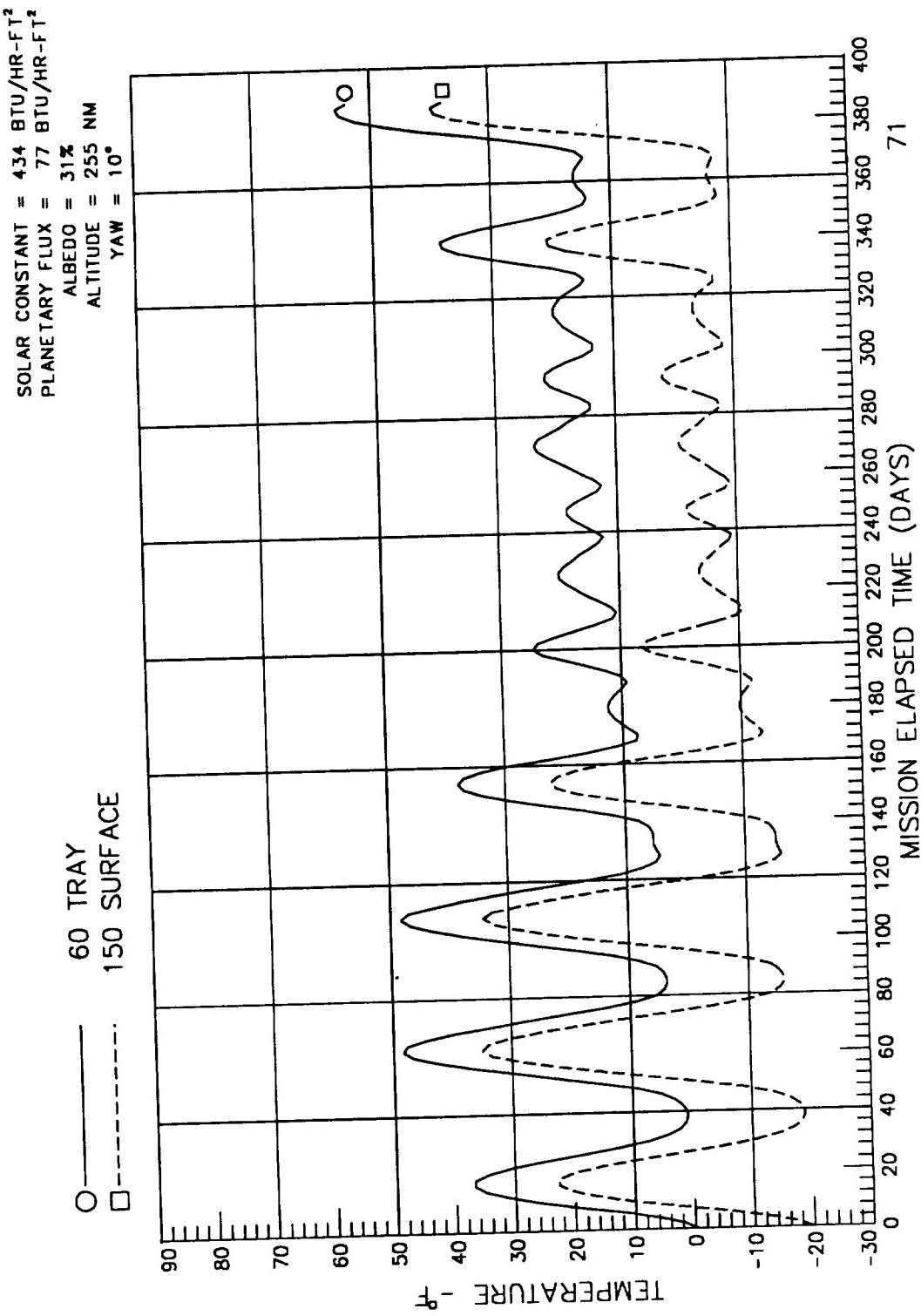
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: C12



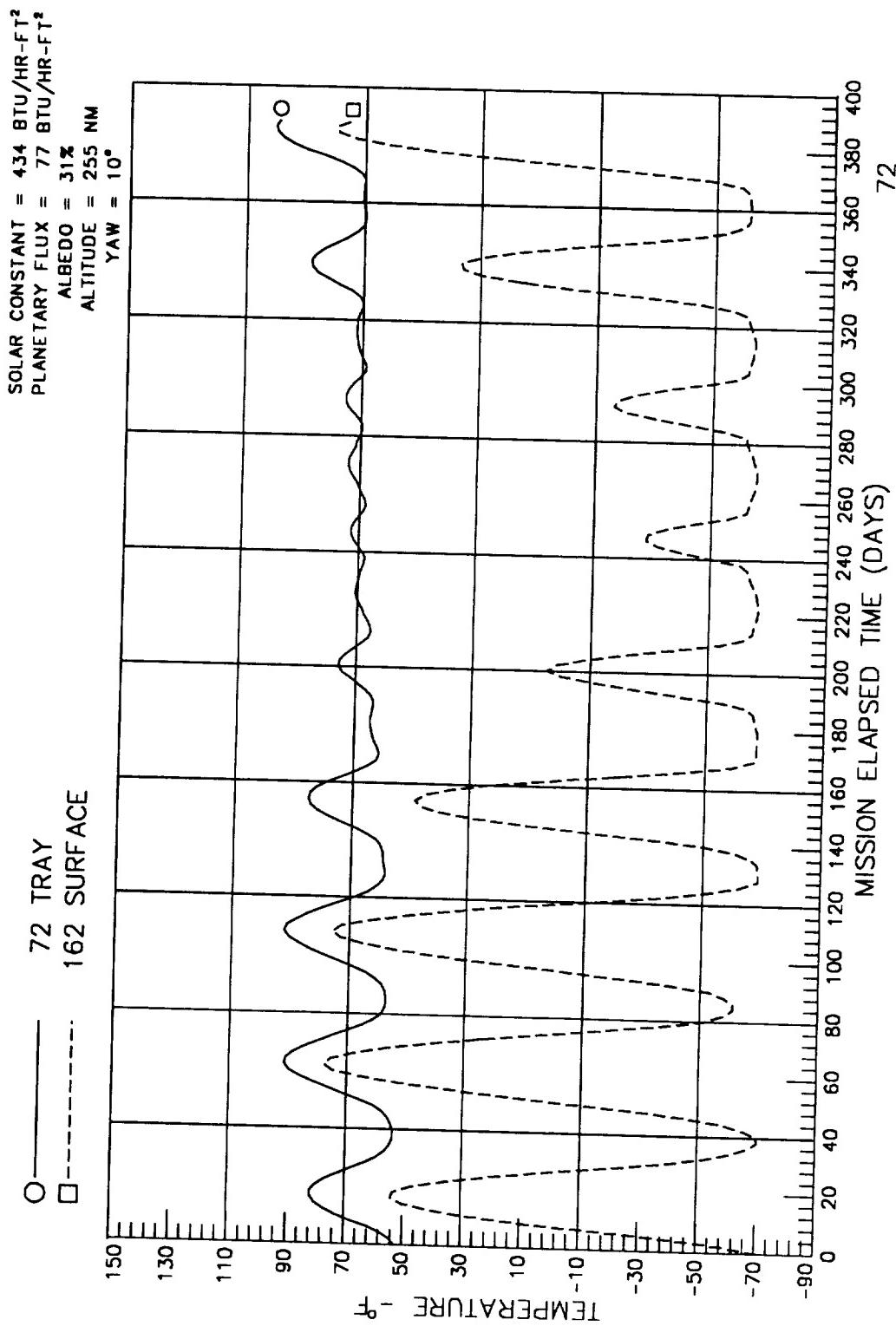
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
LOCATION: D12



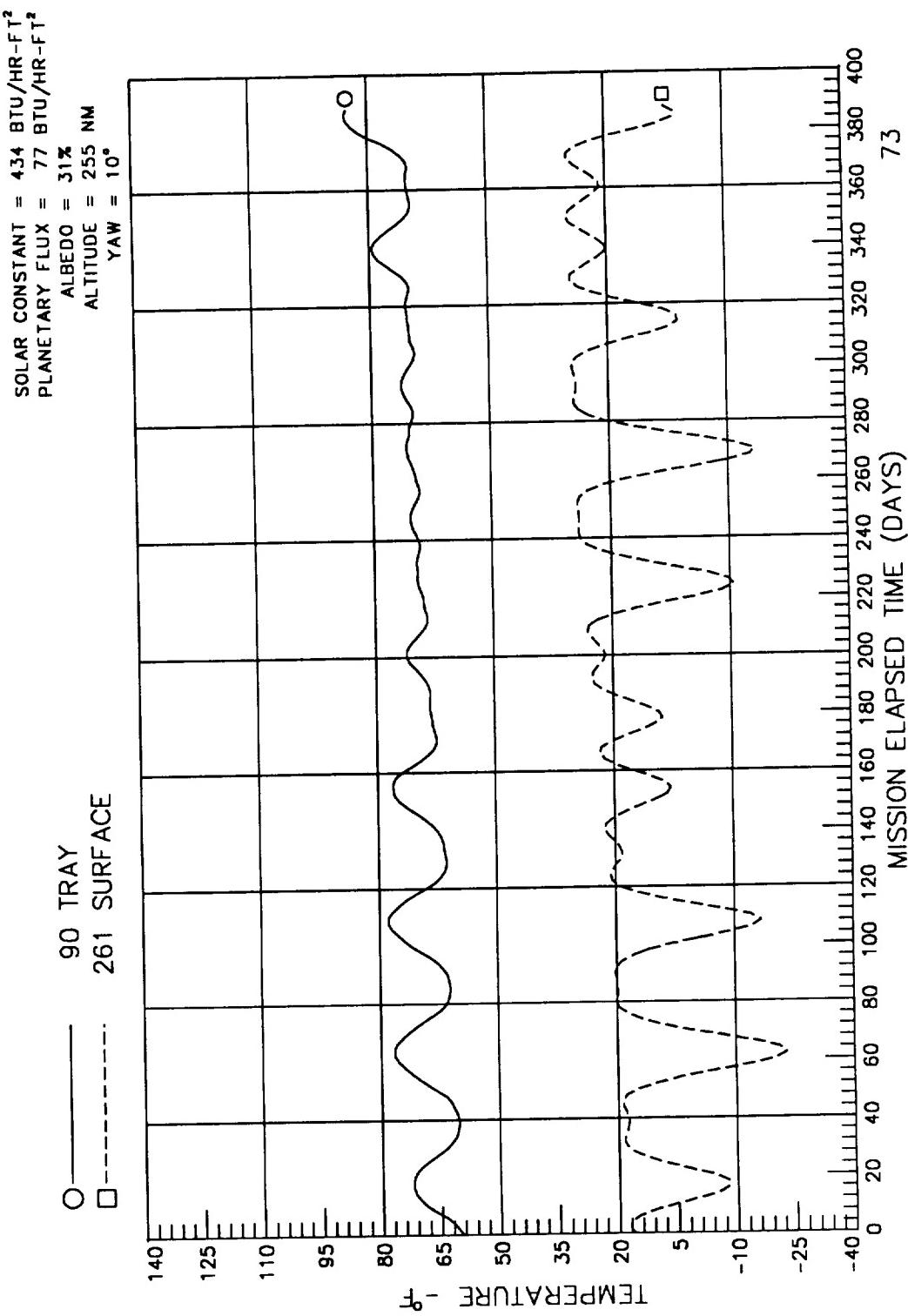
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: E12



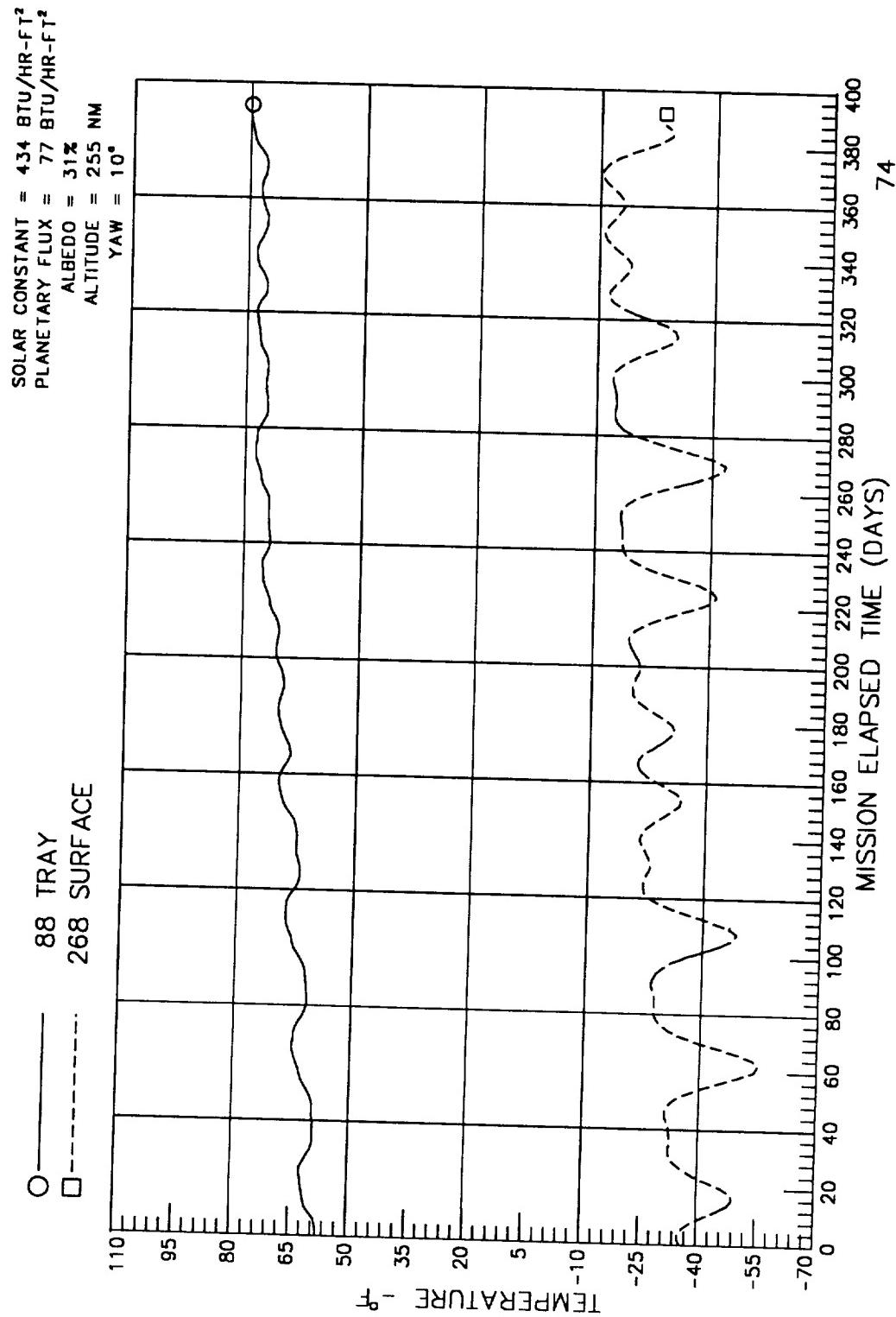
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: F12



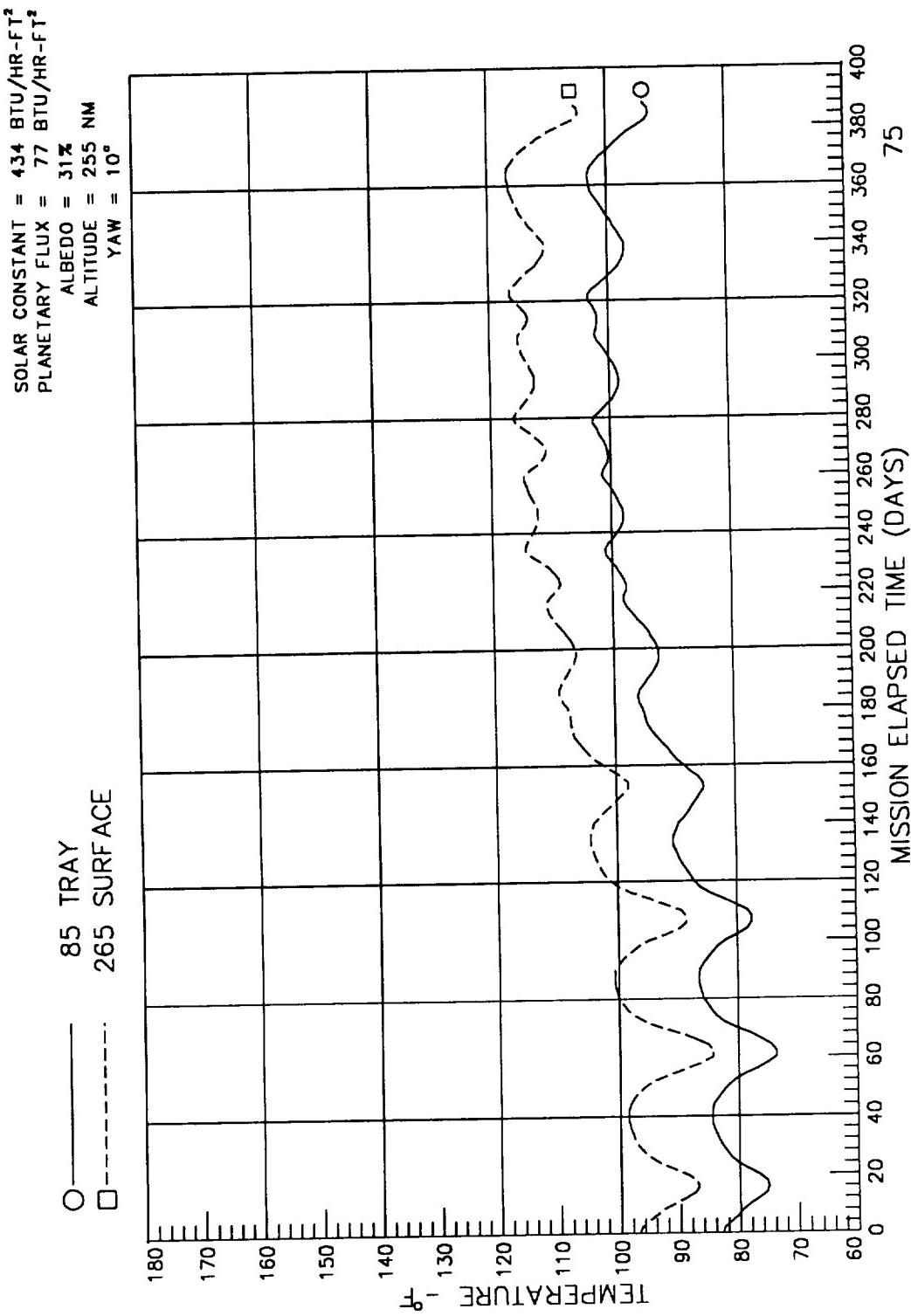
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H1



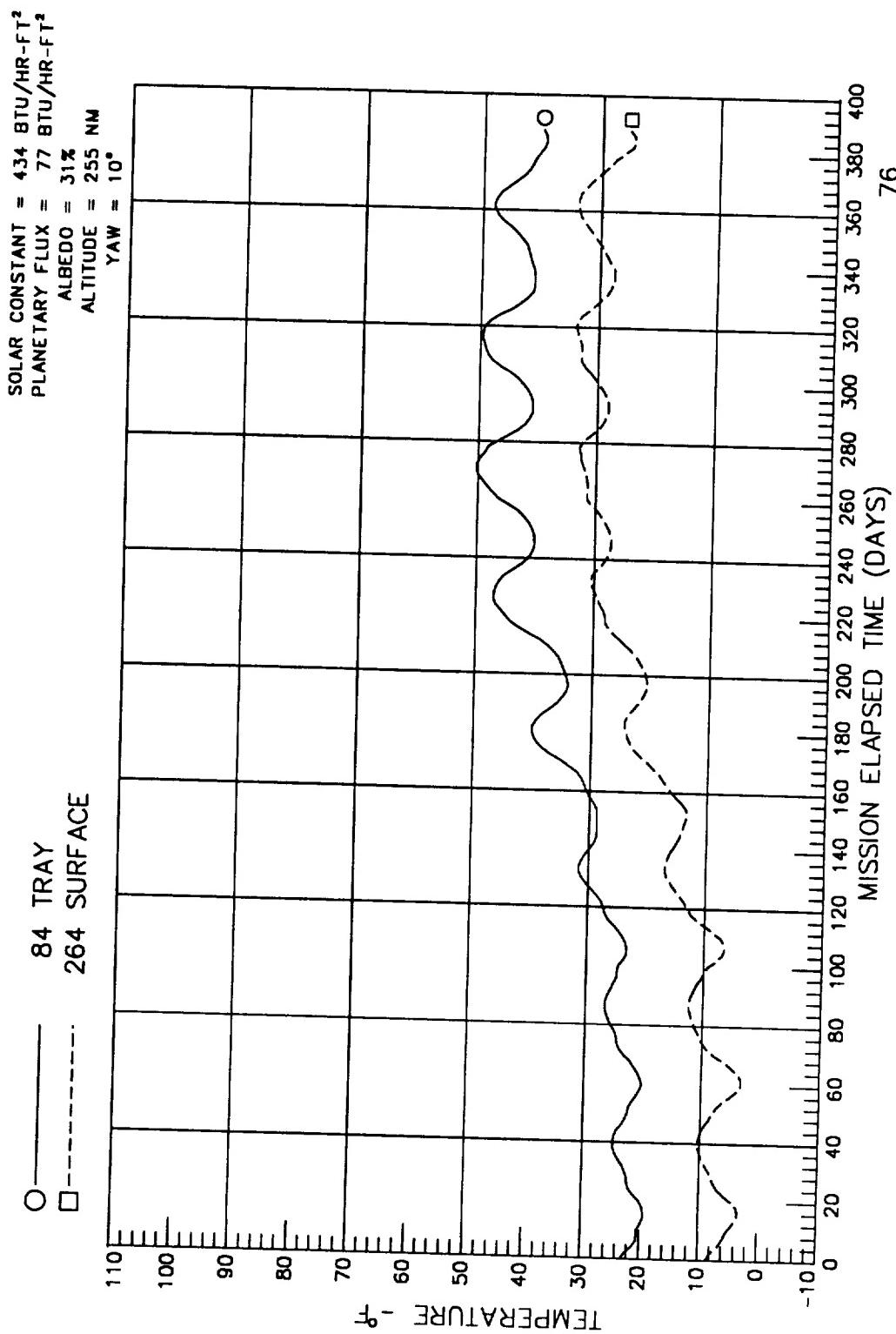
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H5

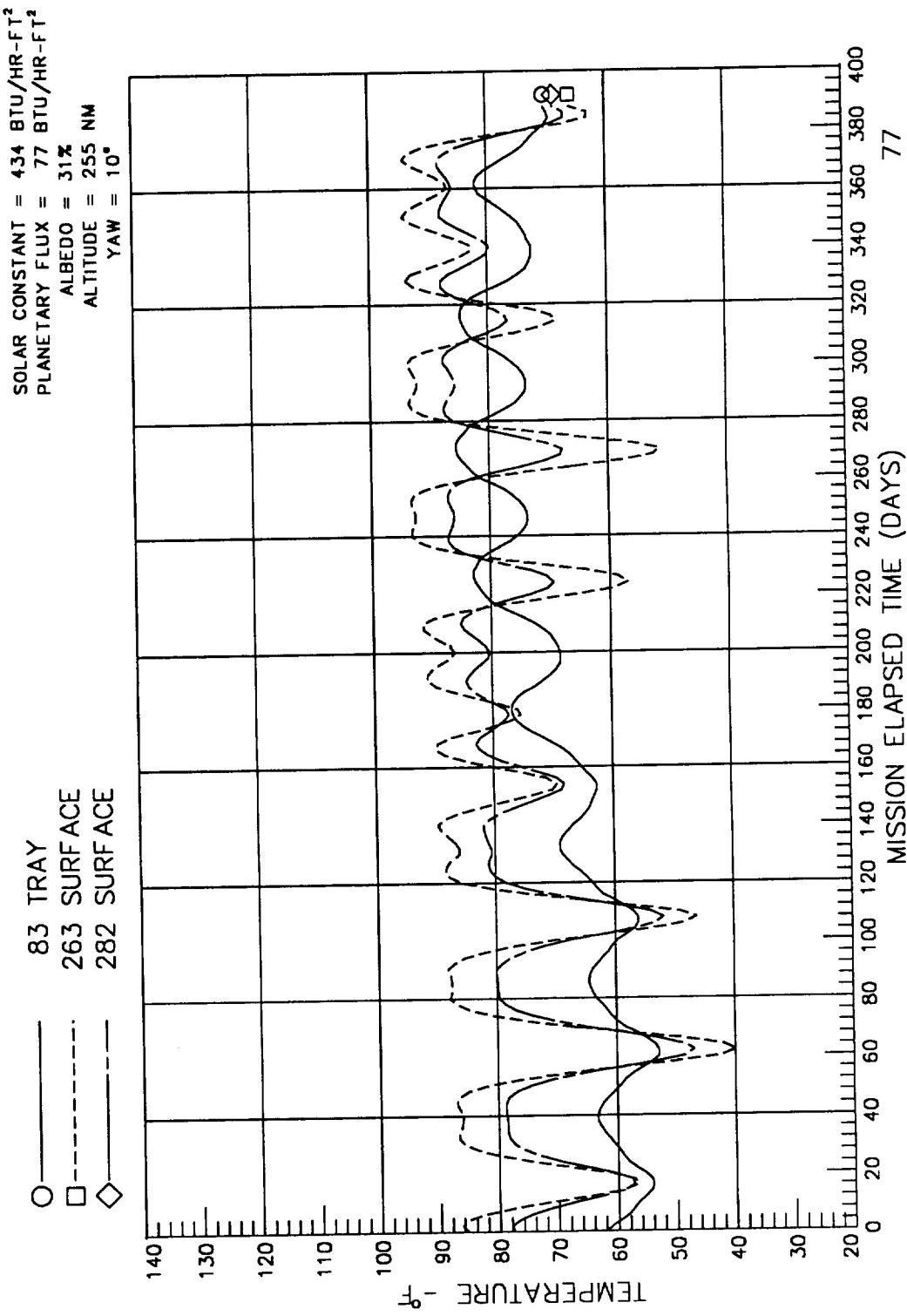


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H6

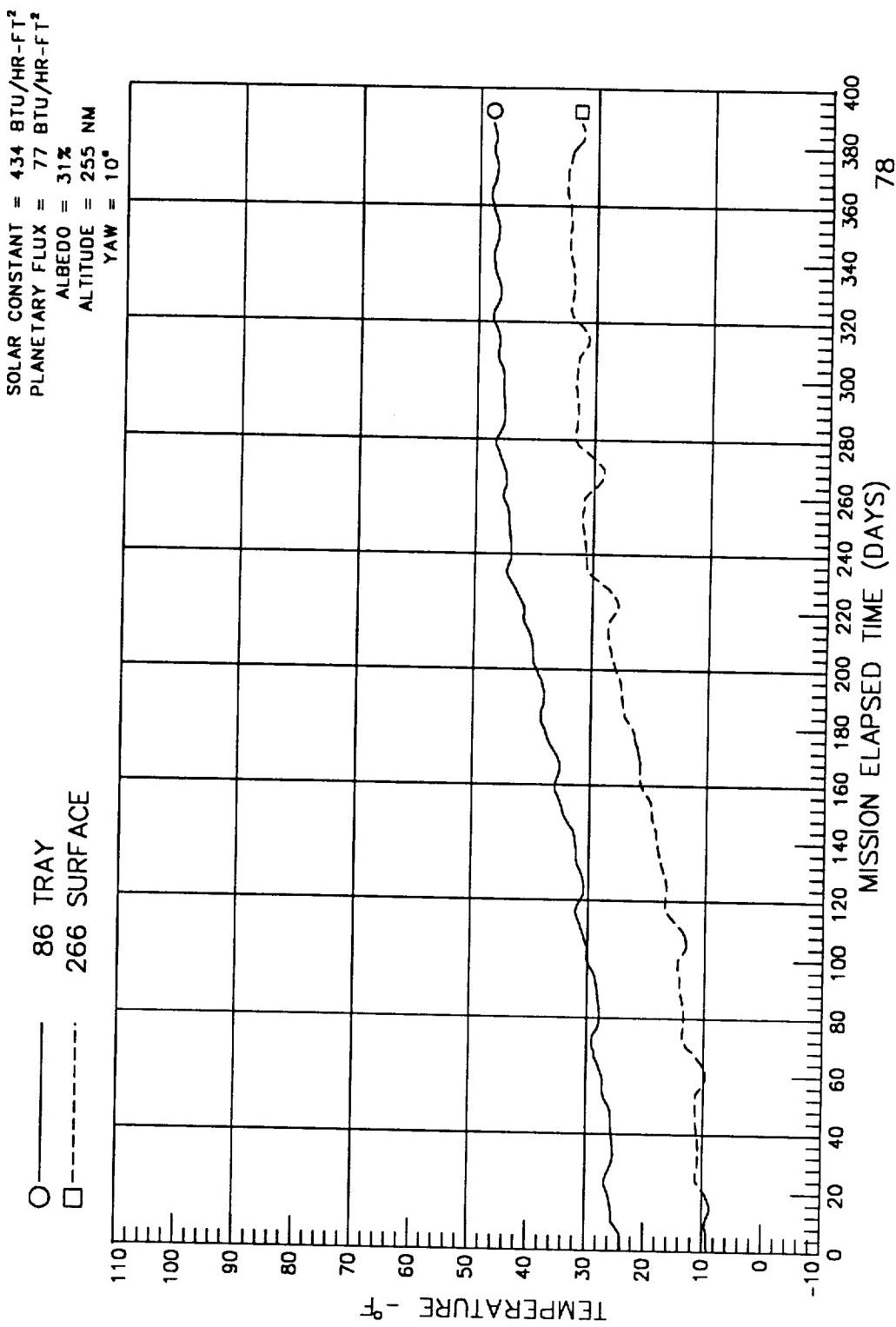


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H7

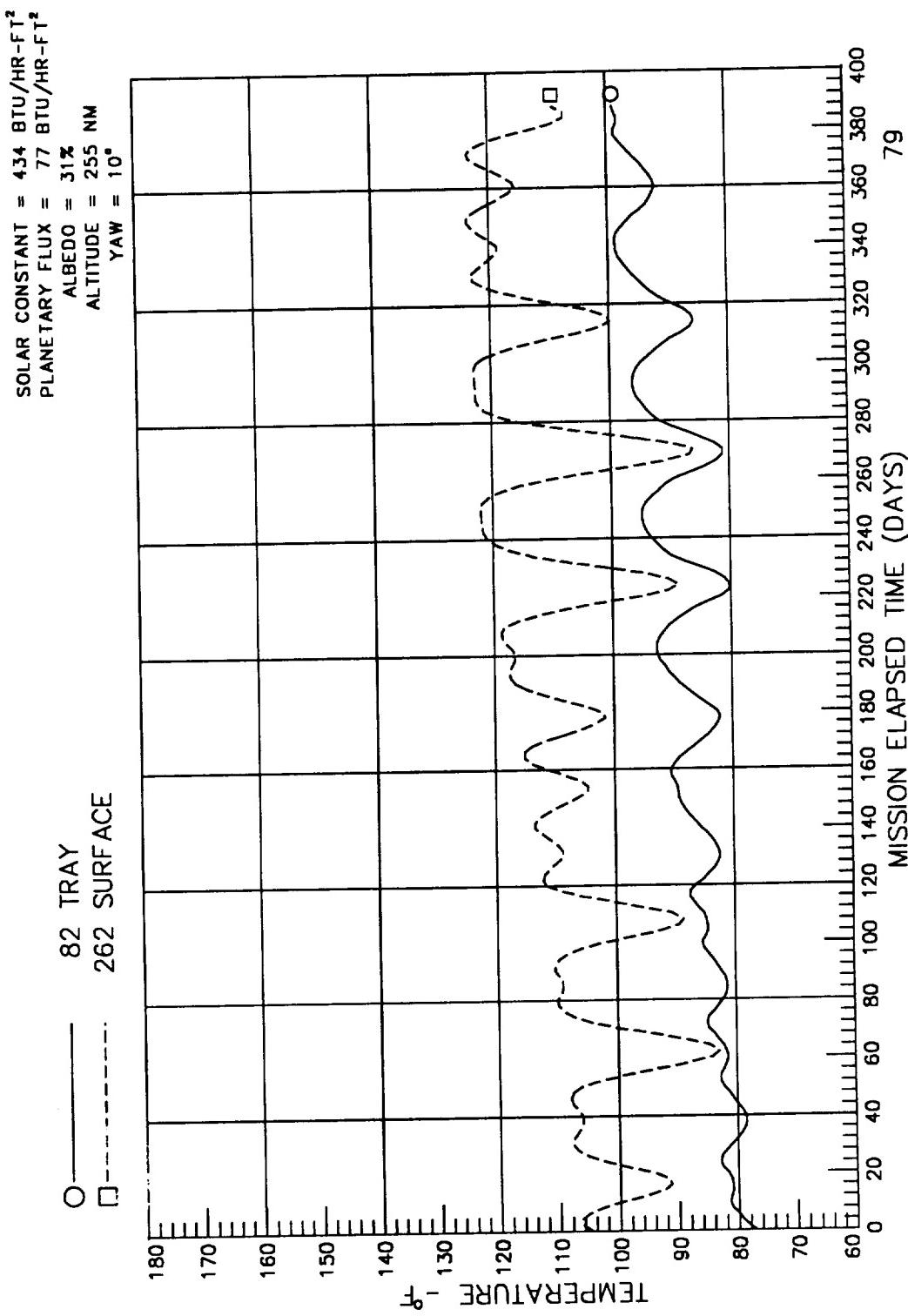
O ————— 83 TRAY
 □ - - - - 263 SURFACE
 ◊ - - - - 282 SURF ACE



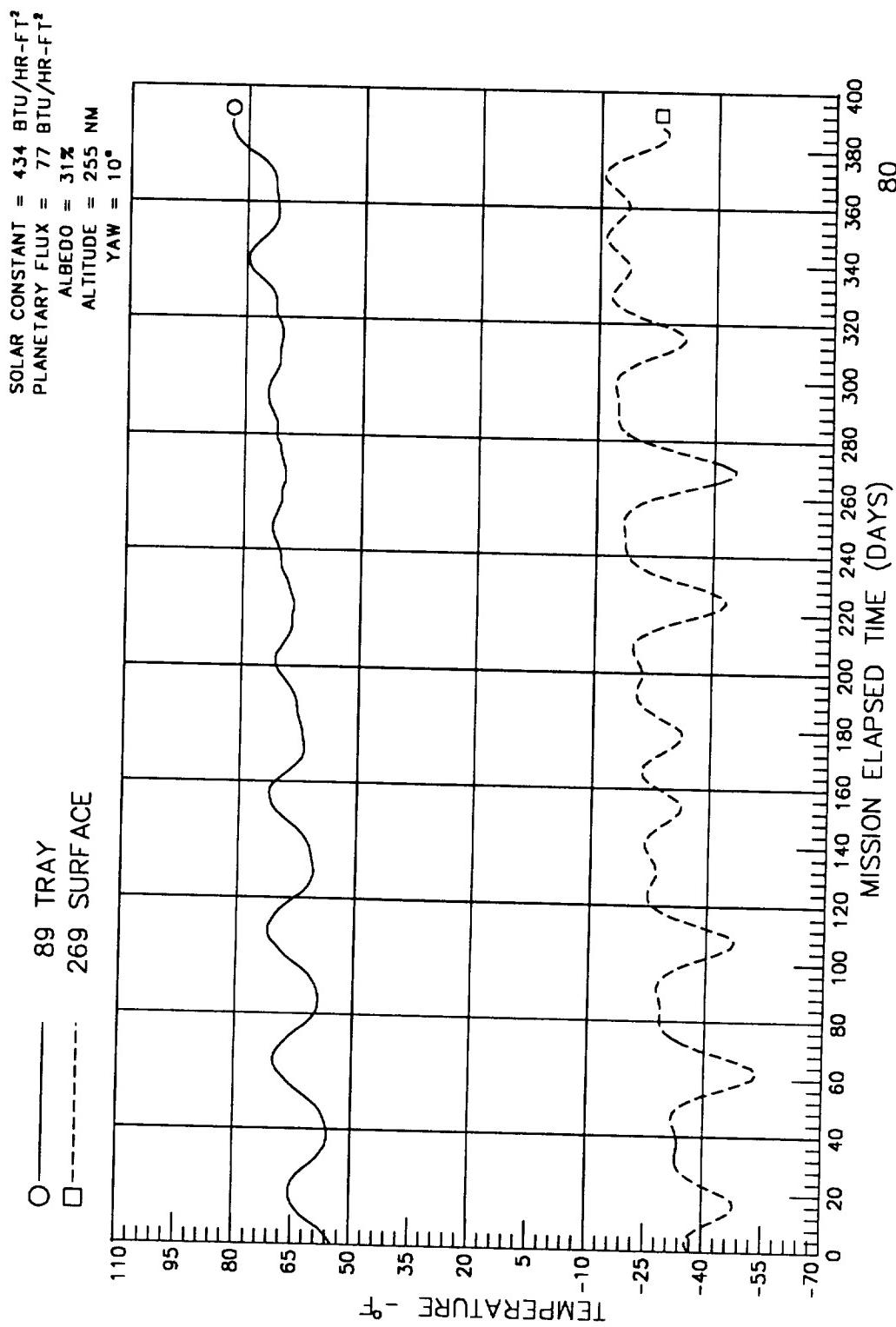
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H9



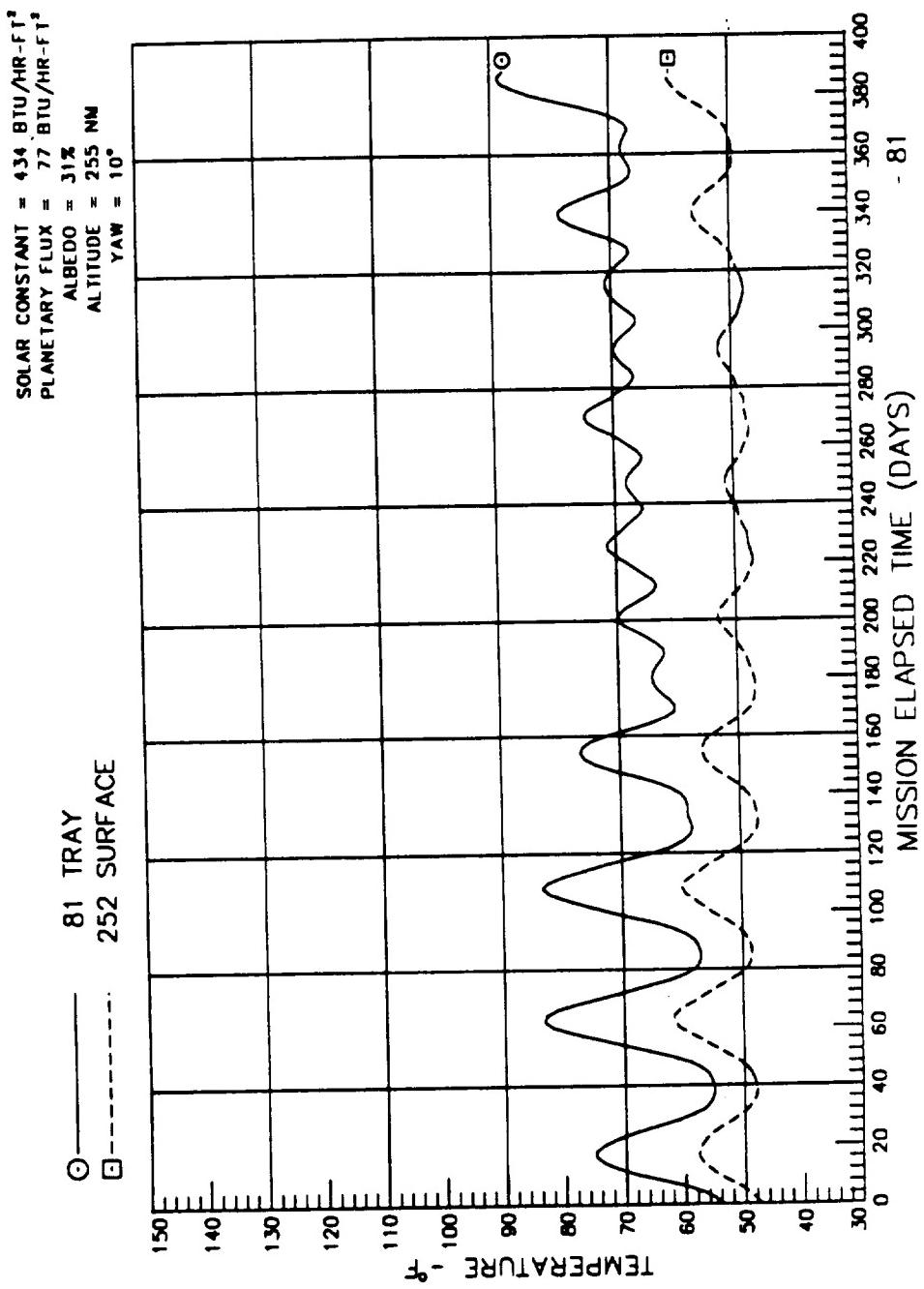
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H11



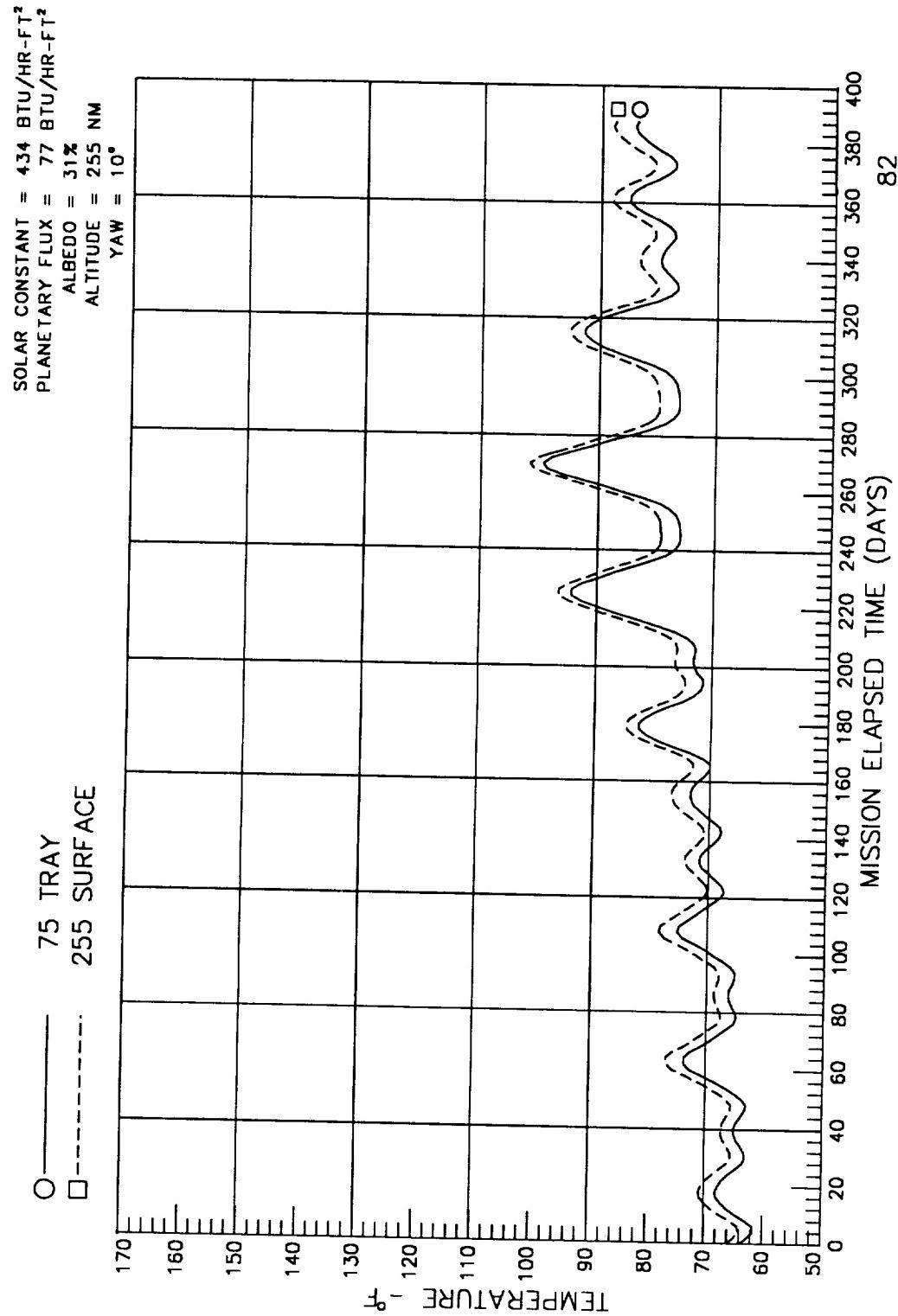
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: H12



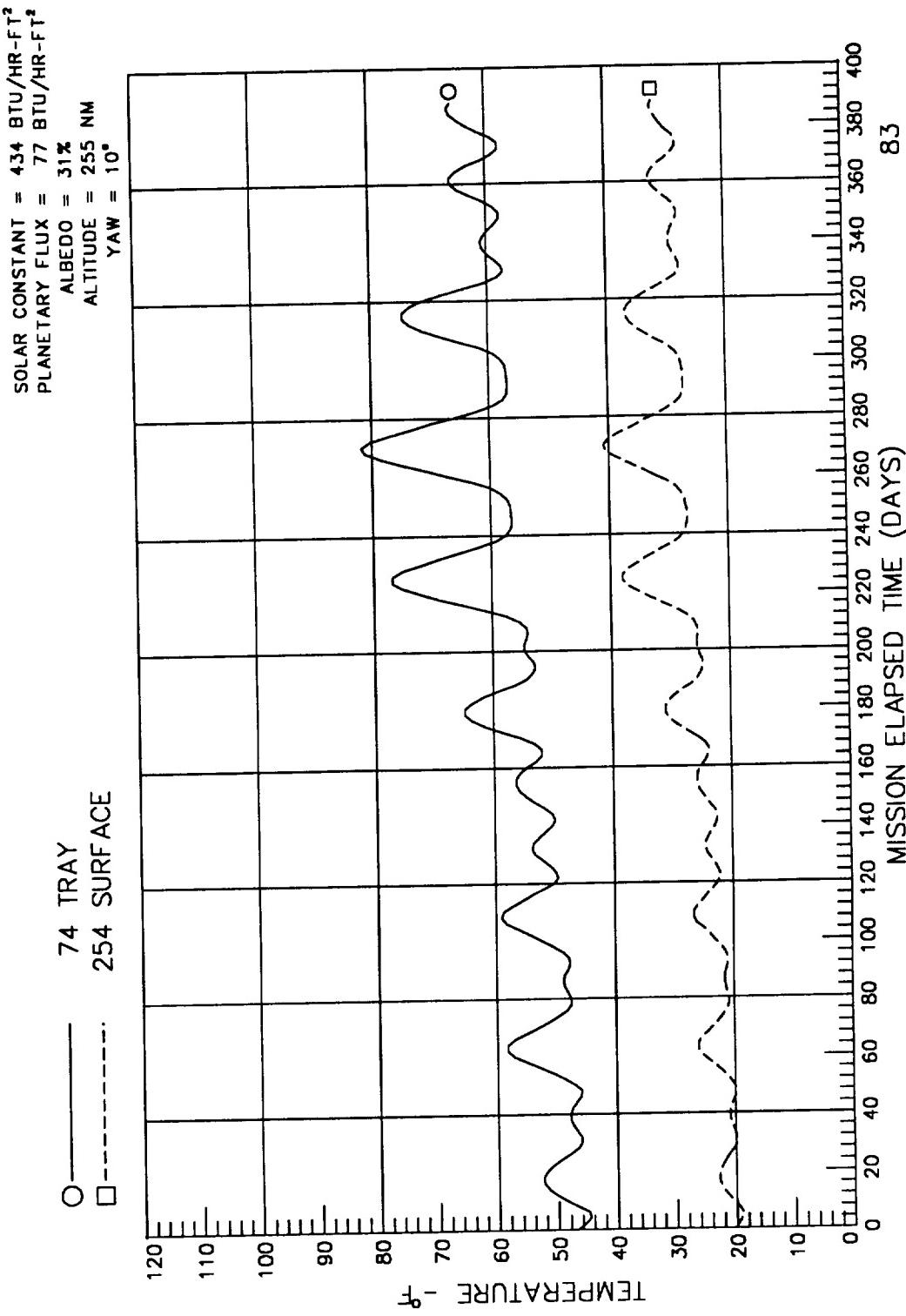
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: G2



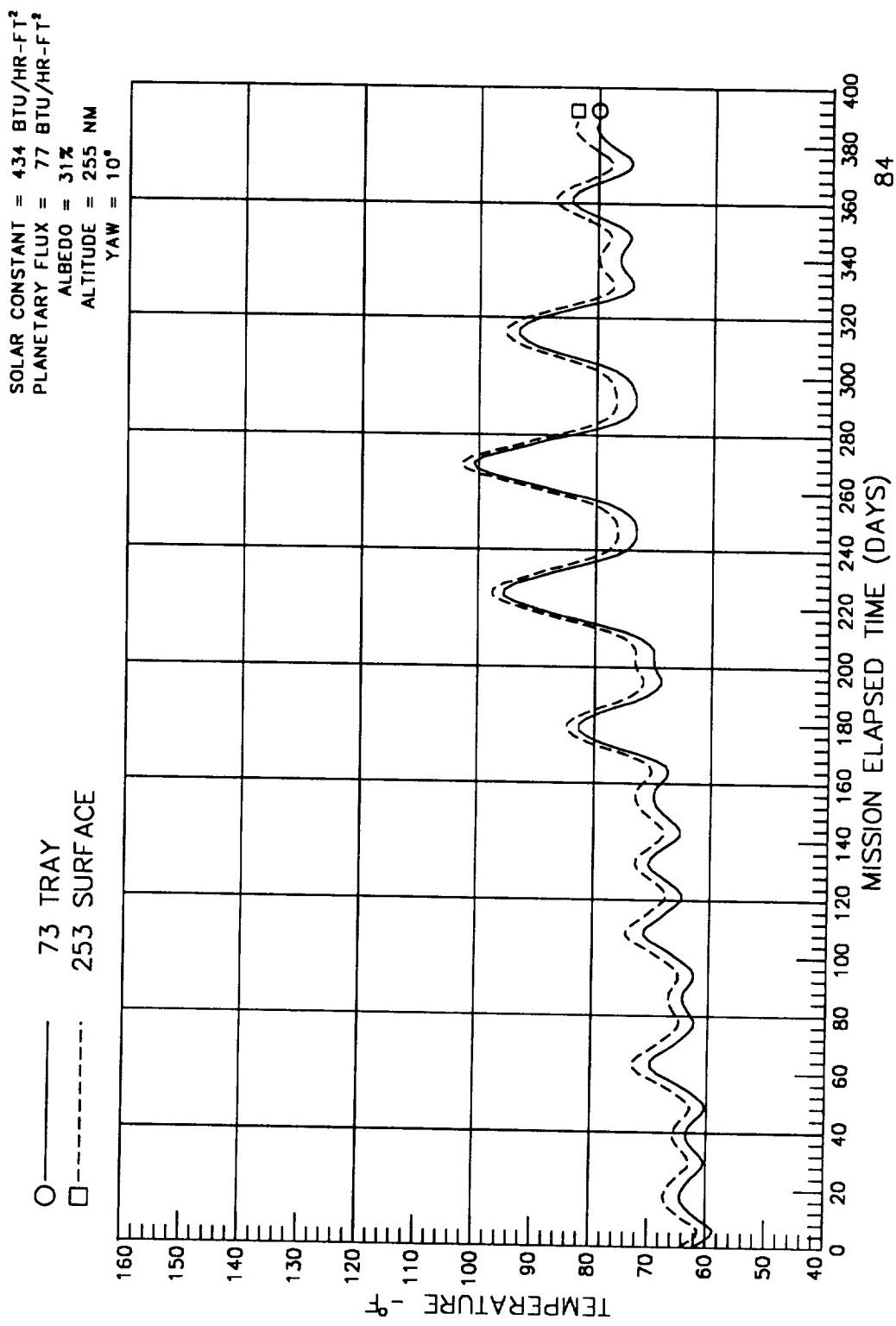
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: G4



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: 66



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: 68

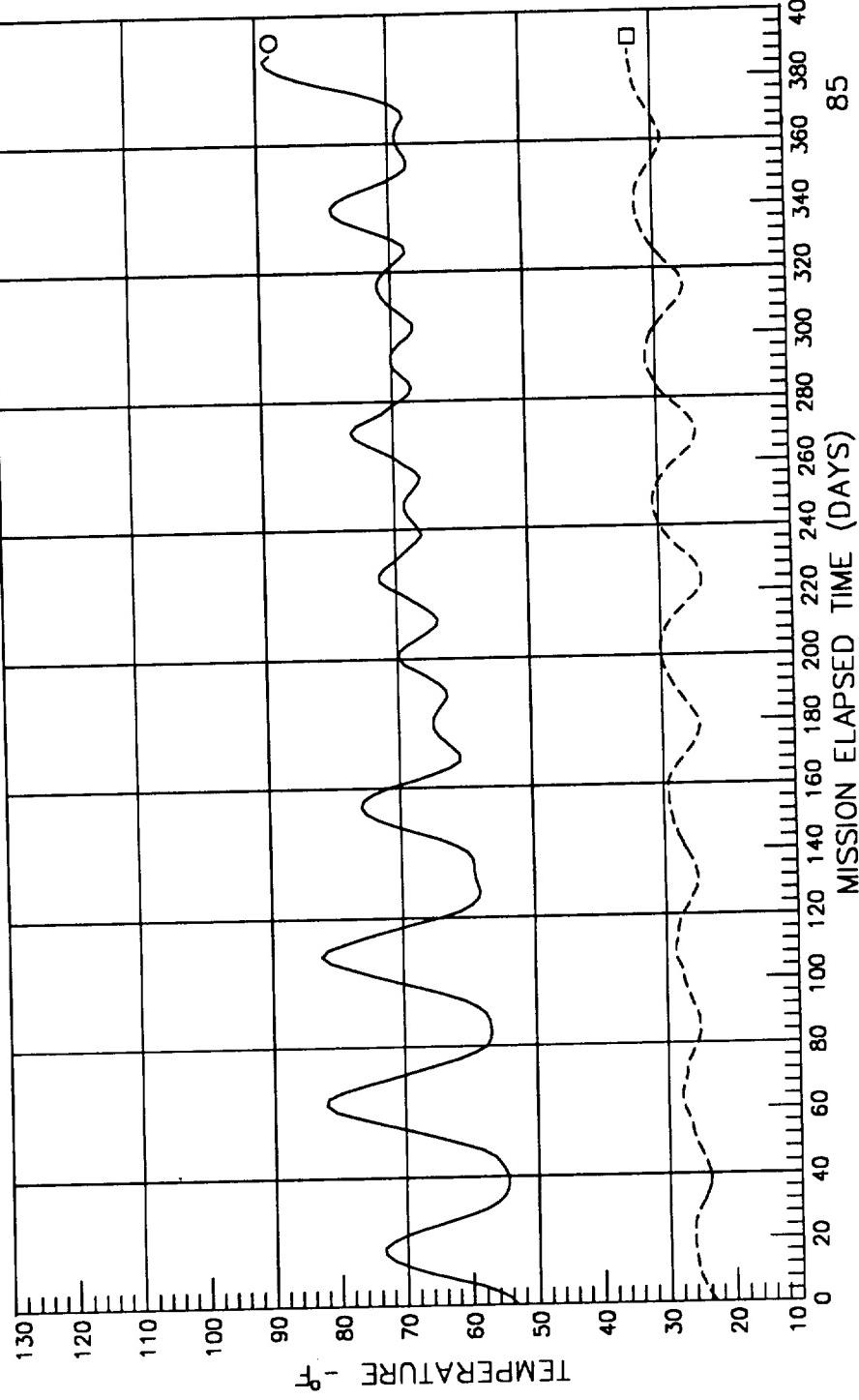


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: 610

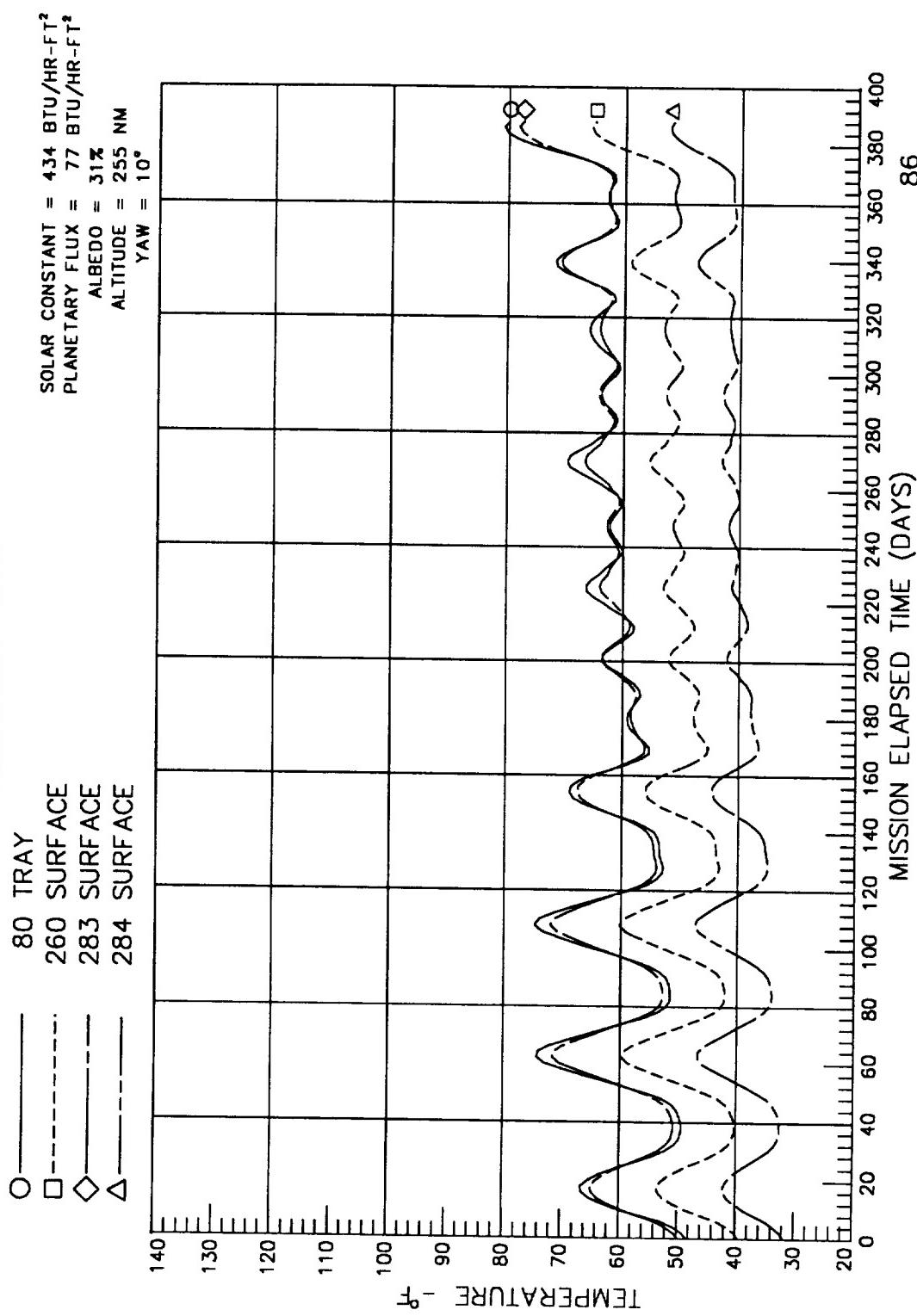
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

○ — 79 TRAY
 □ - - - 259 SURFACE



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LOCATION: G12



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE: LOC A1

○ -----	163 LONGERON 12-1
□ -----	164 LONGERON 1-2
◇ -----	175 END LONGRN 12-1
△ -----	176 END LONGRN 1-2

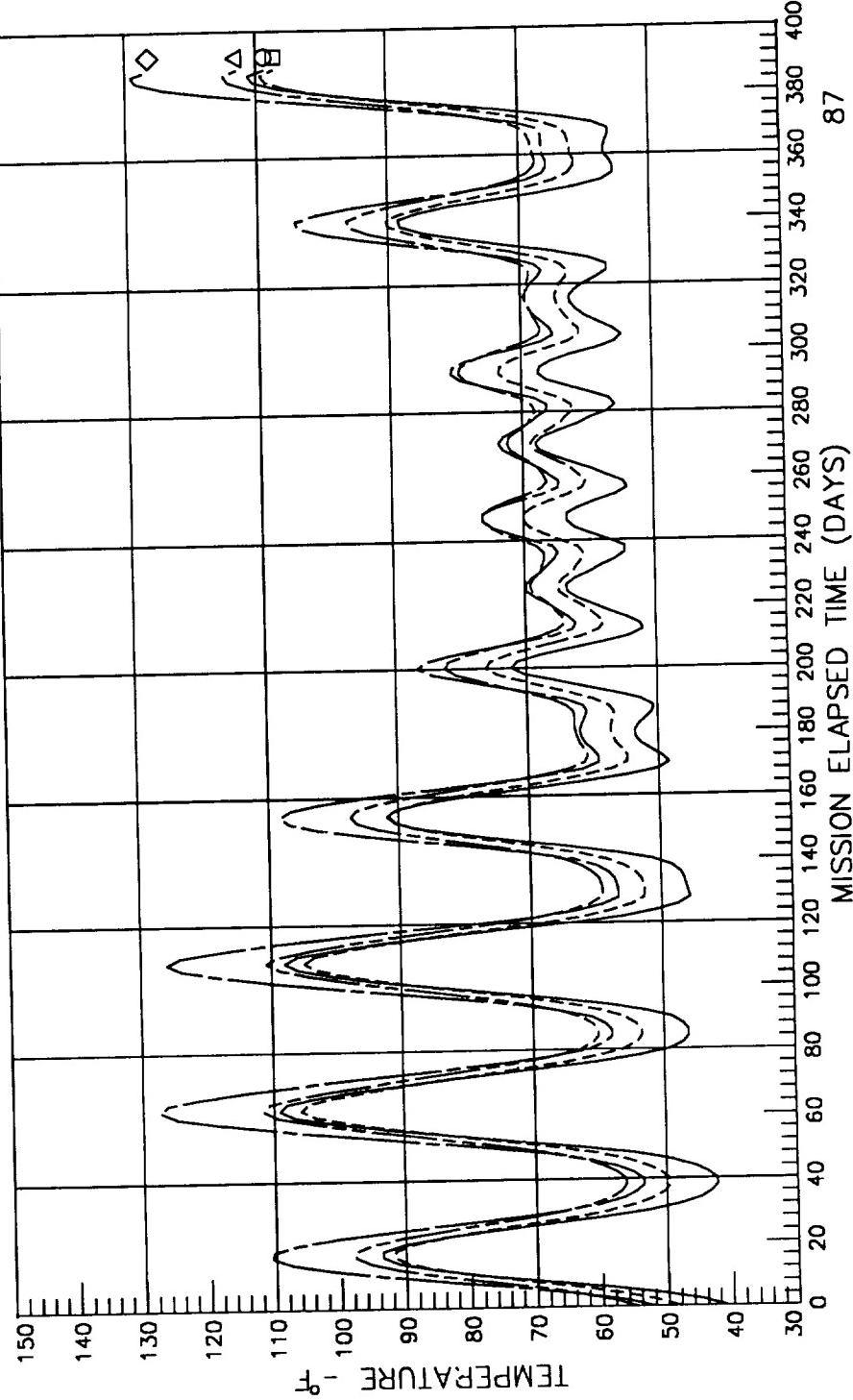
SOLAR CONSTANT = 434 BTU/HR-F²

PLANETARY FLUX = 77 BTU/HR-F²

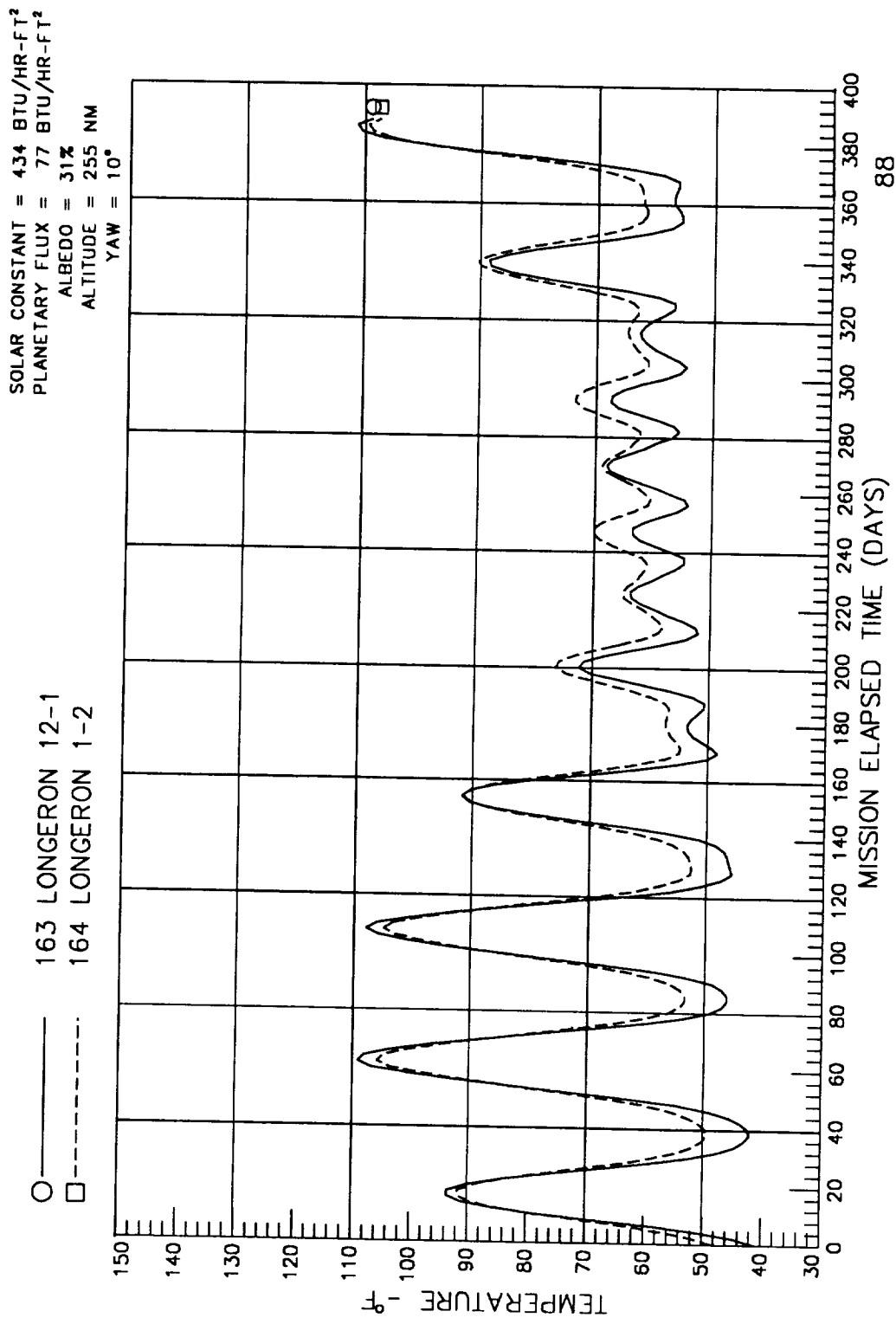
ALBEDO = 31%

ALTITUDE = 255 NM

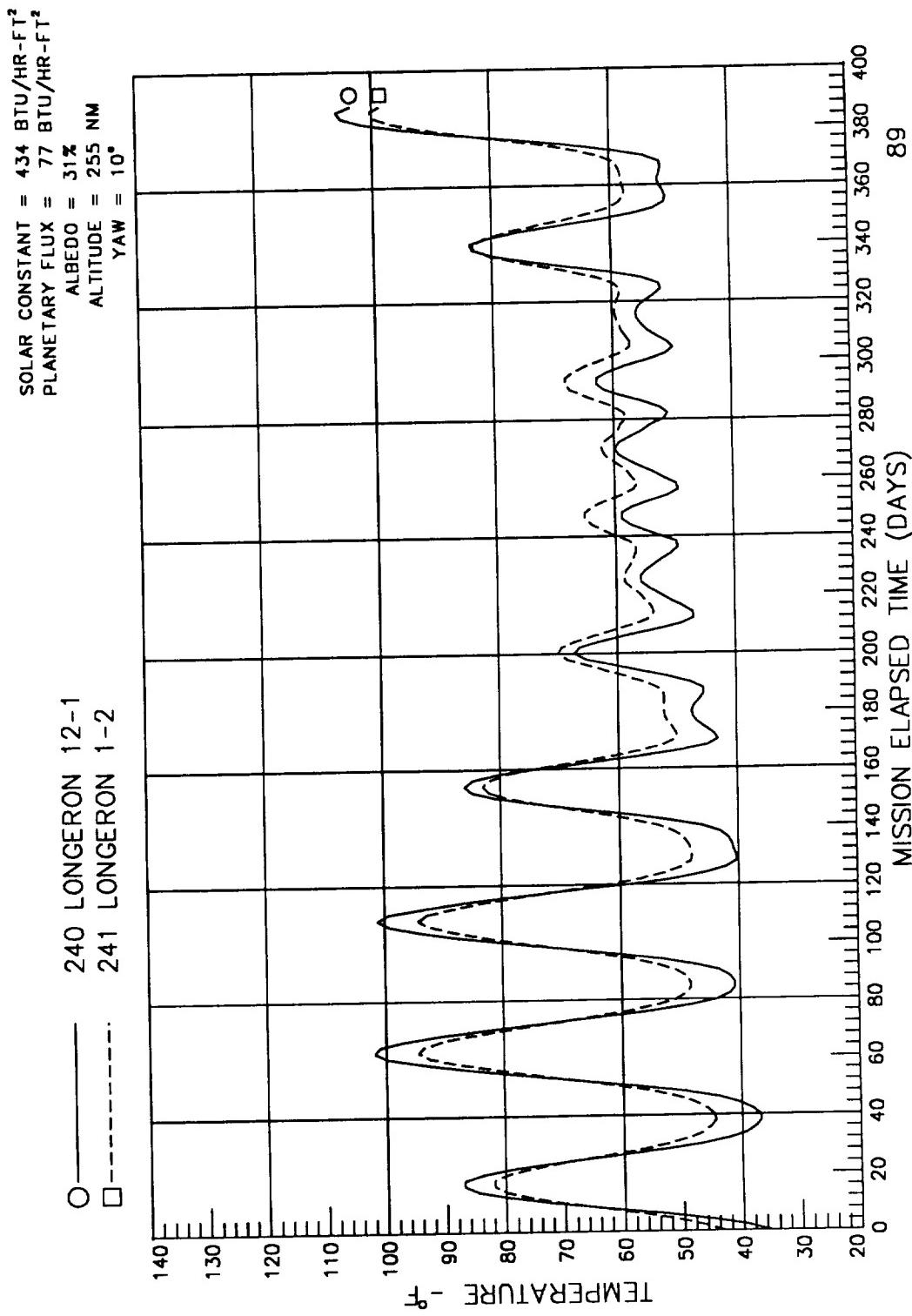
YAW = 10°



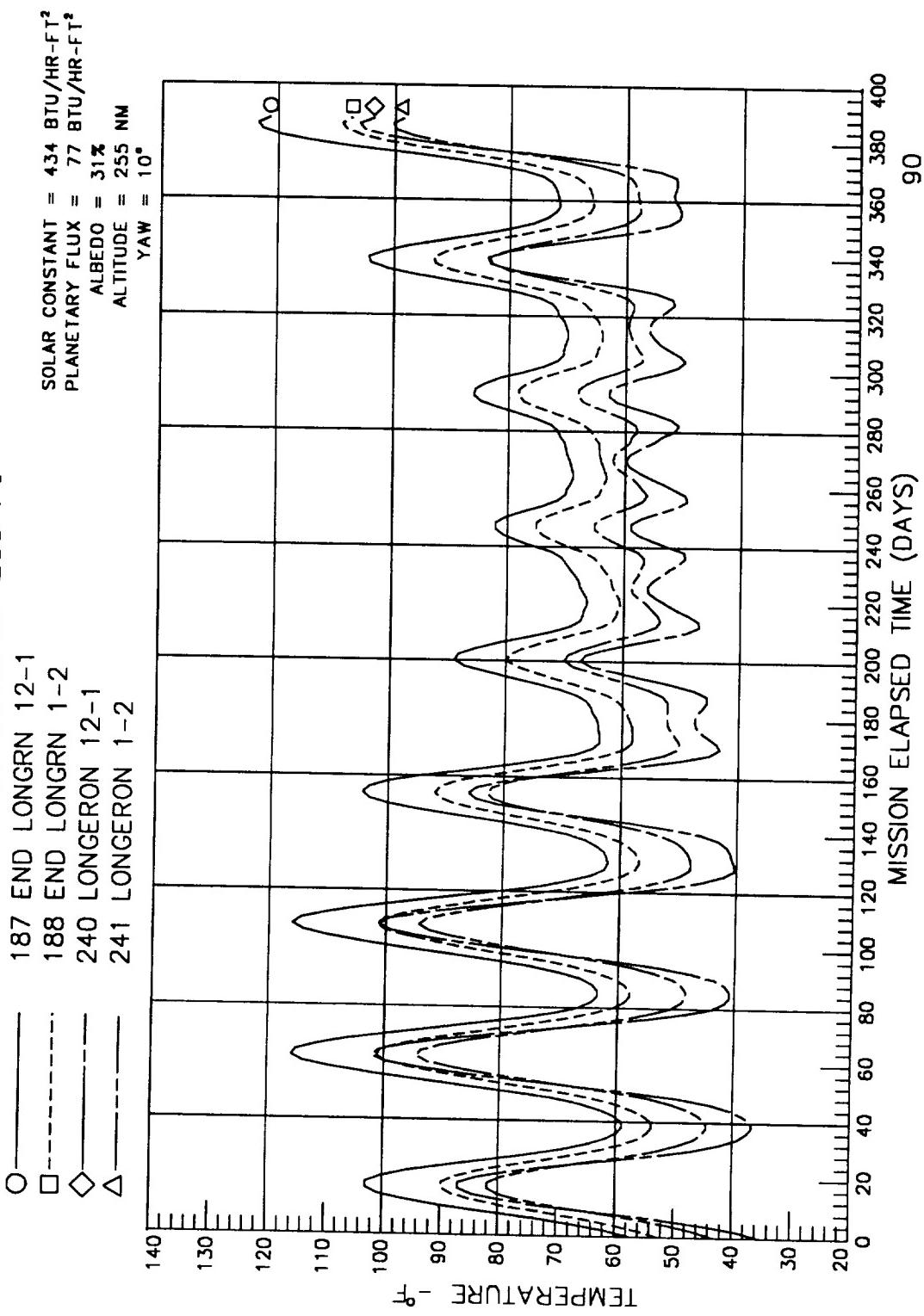
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B1 & C1



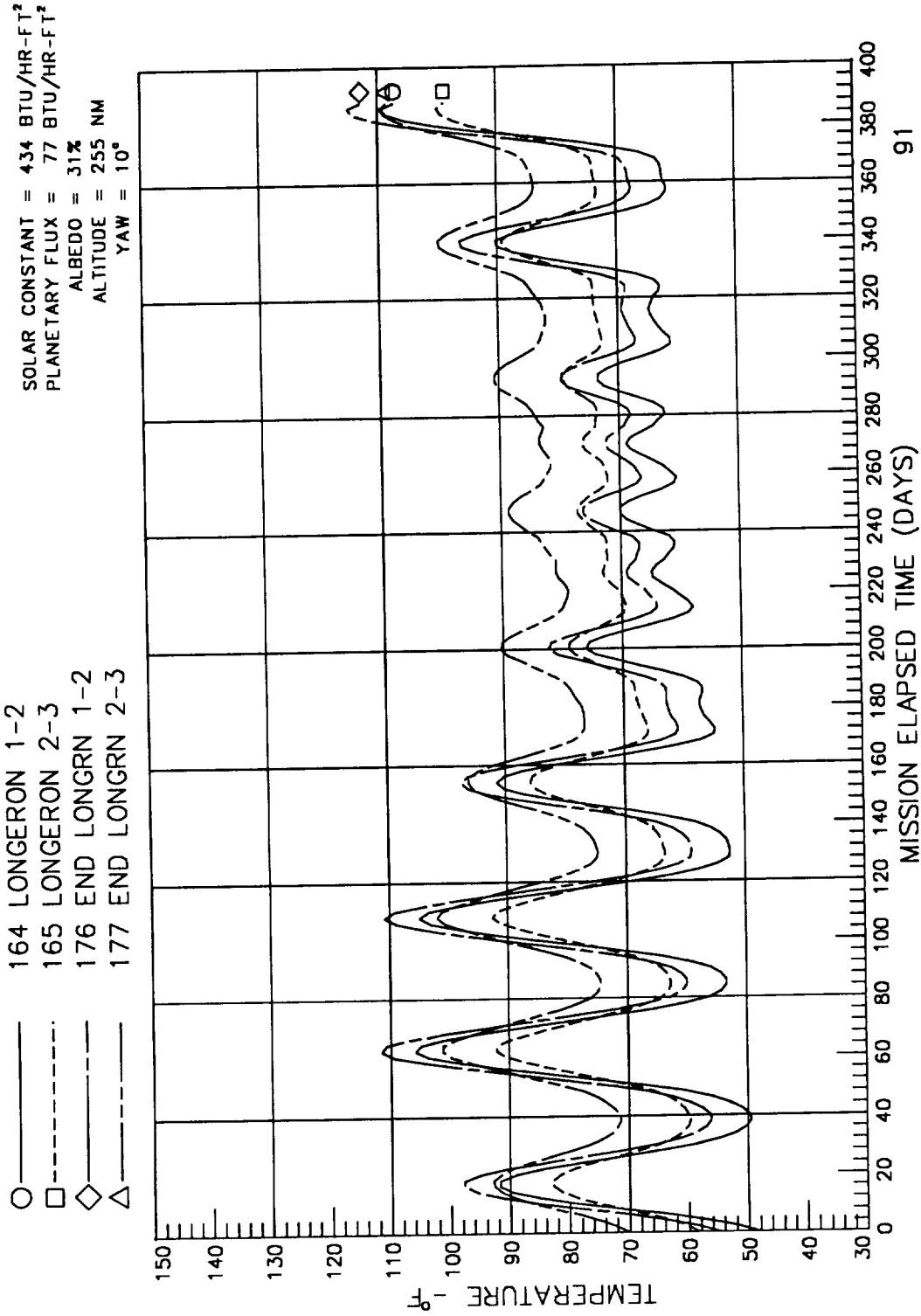
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D1 & E1



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F1

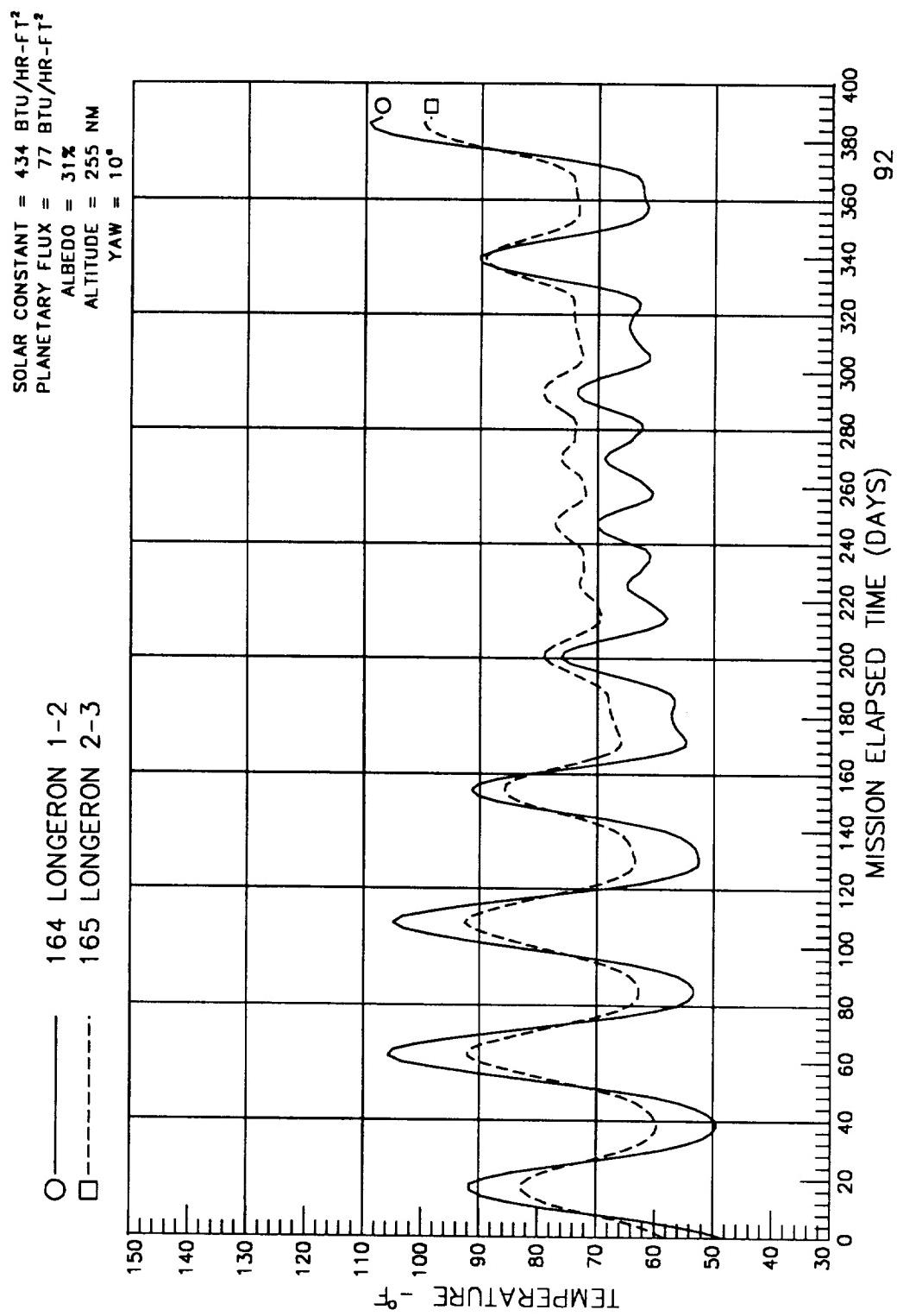


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A2

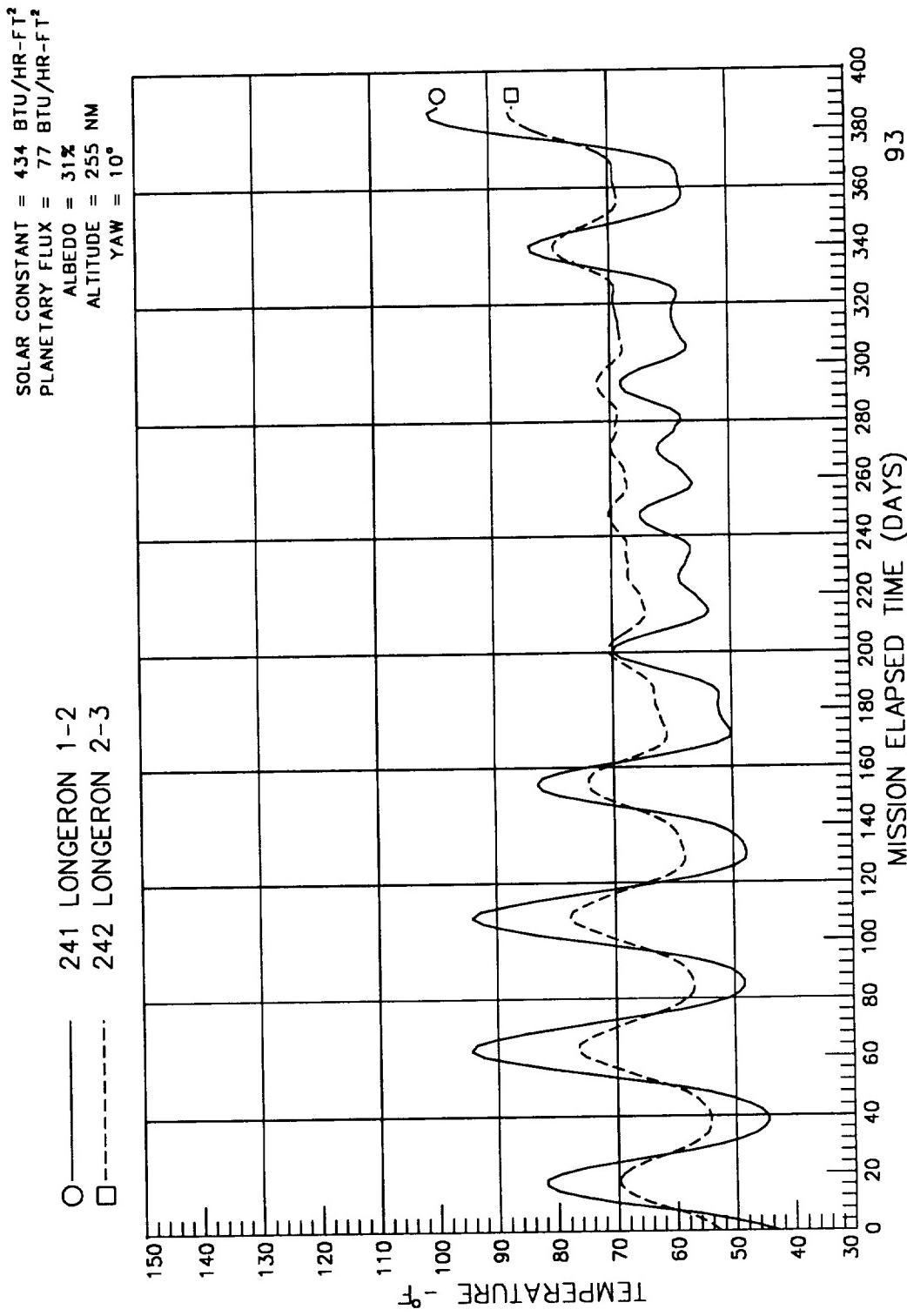


91

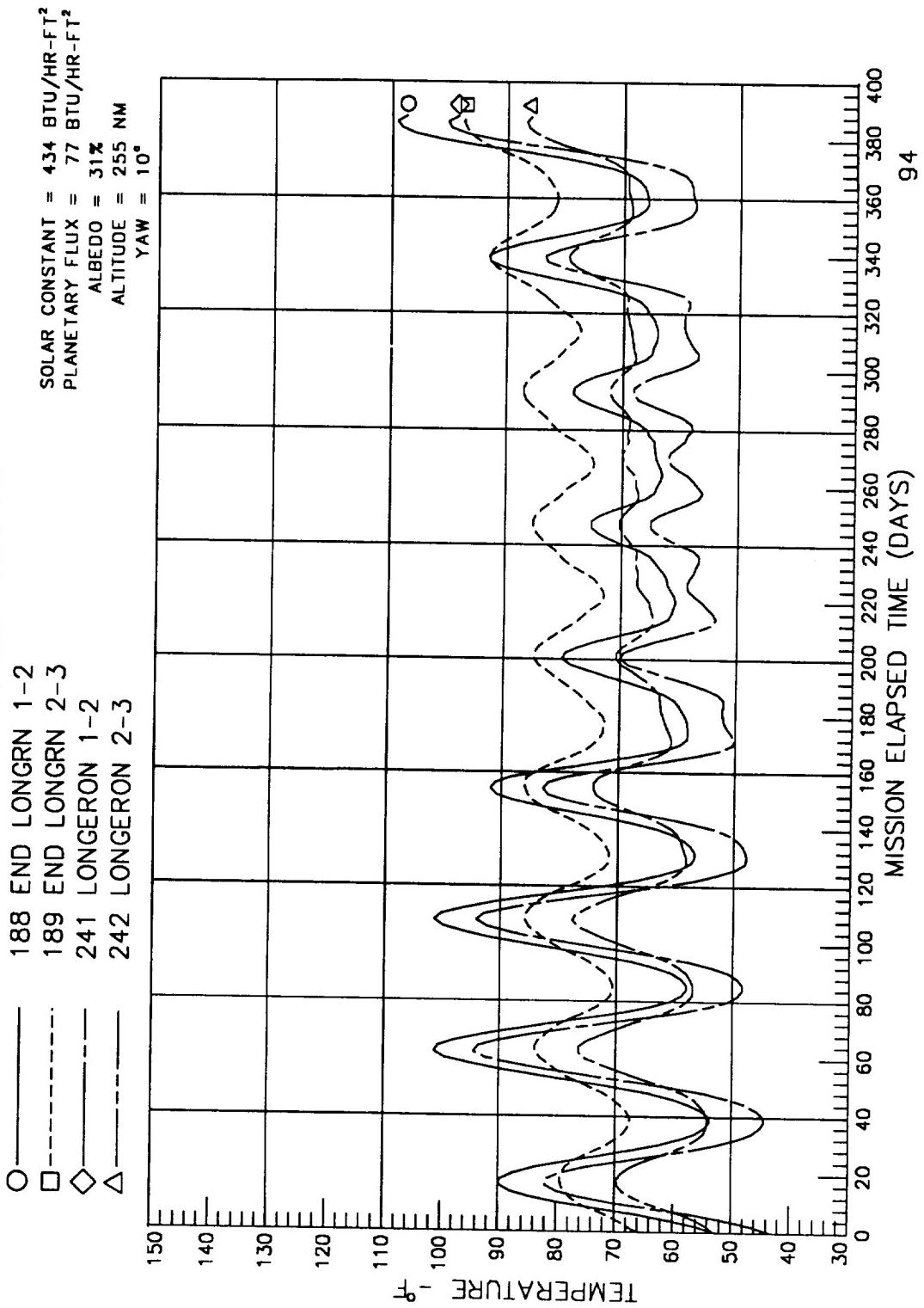
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B2 & C2



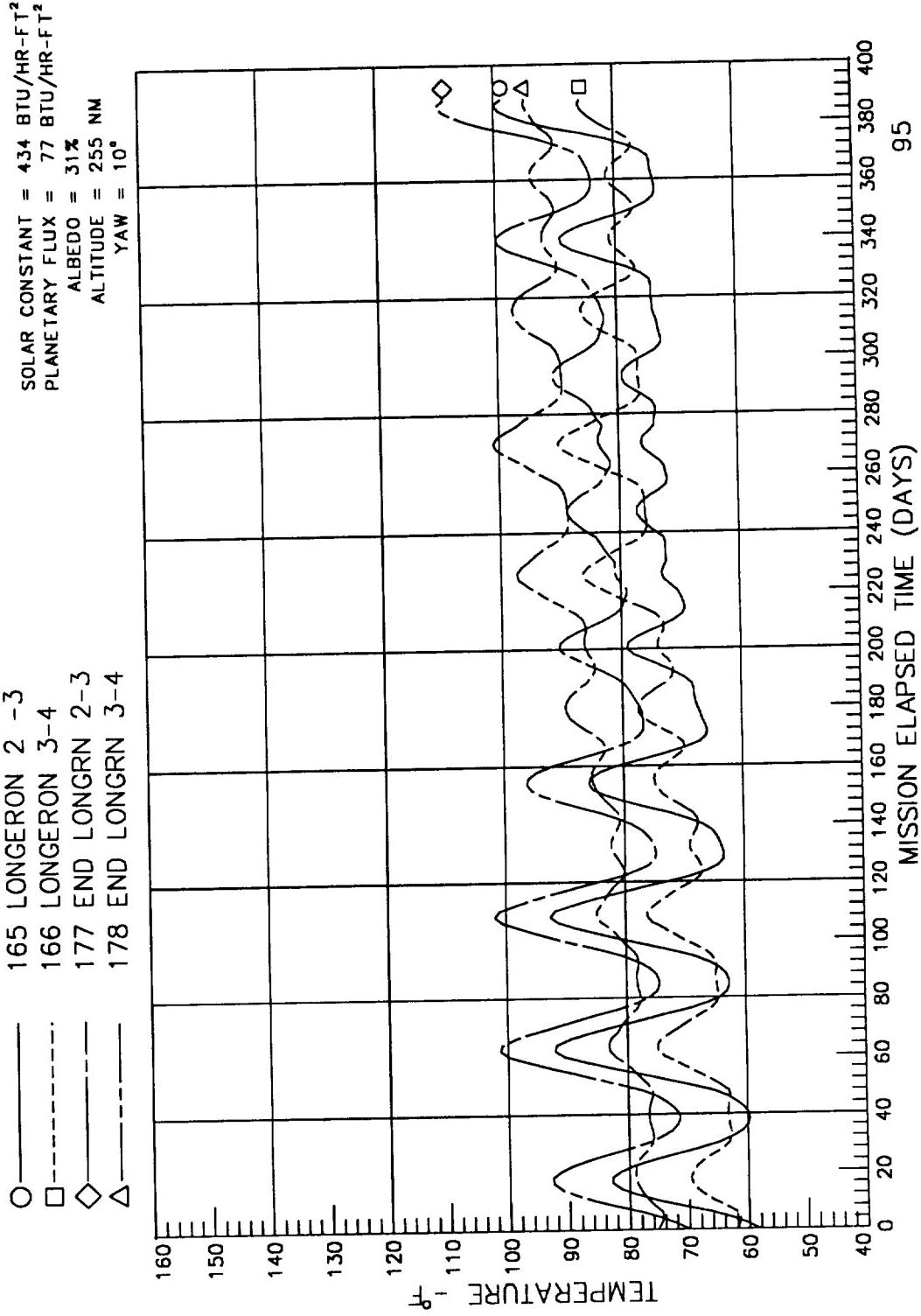
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC D2 & E2



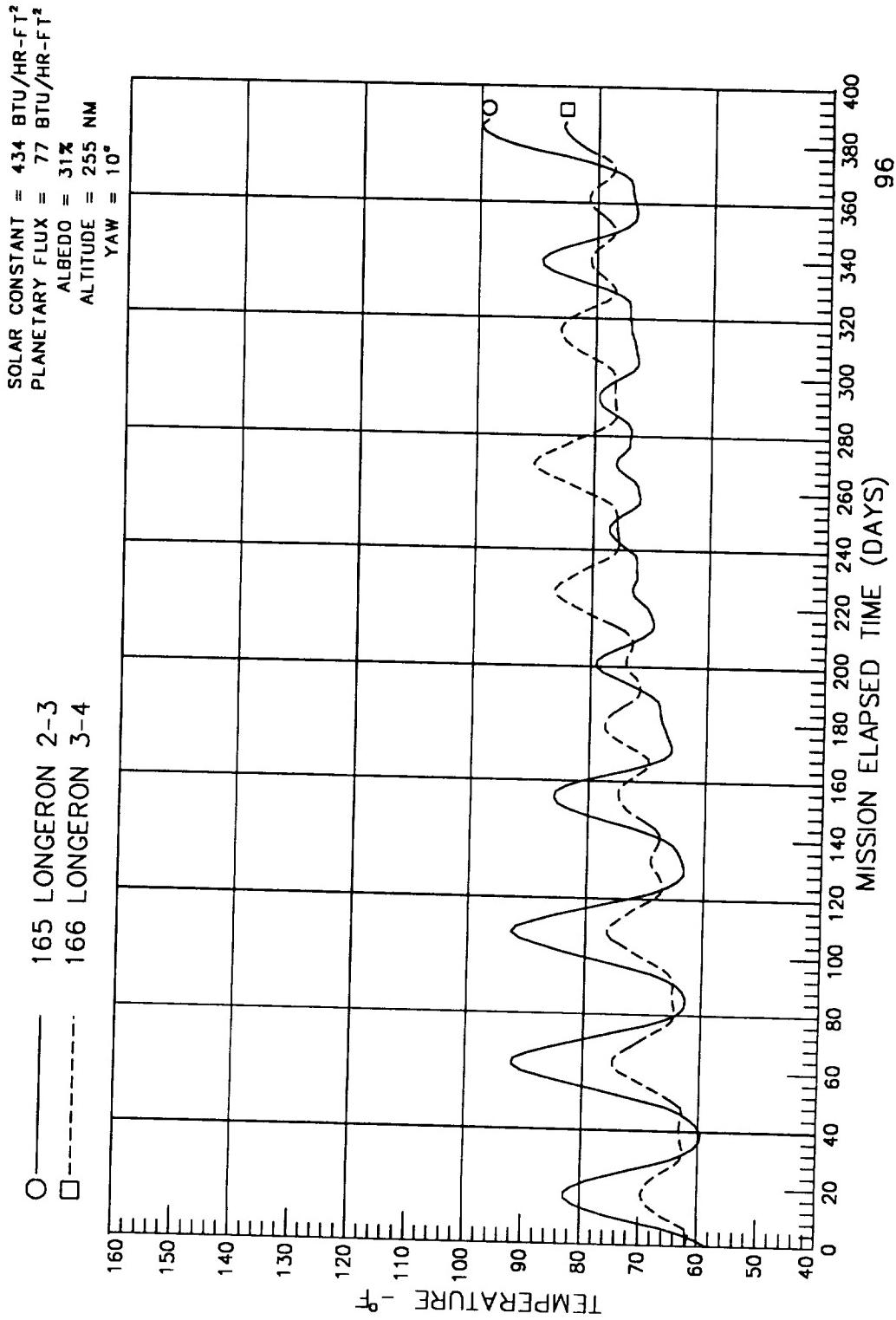
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F2



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B3 & C3

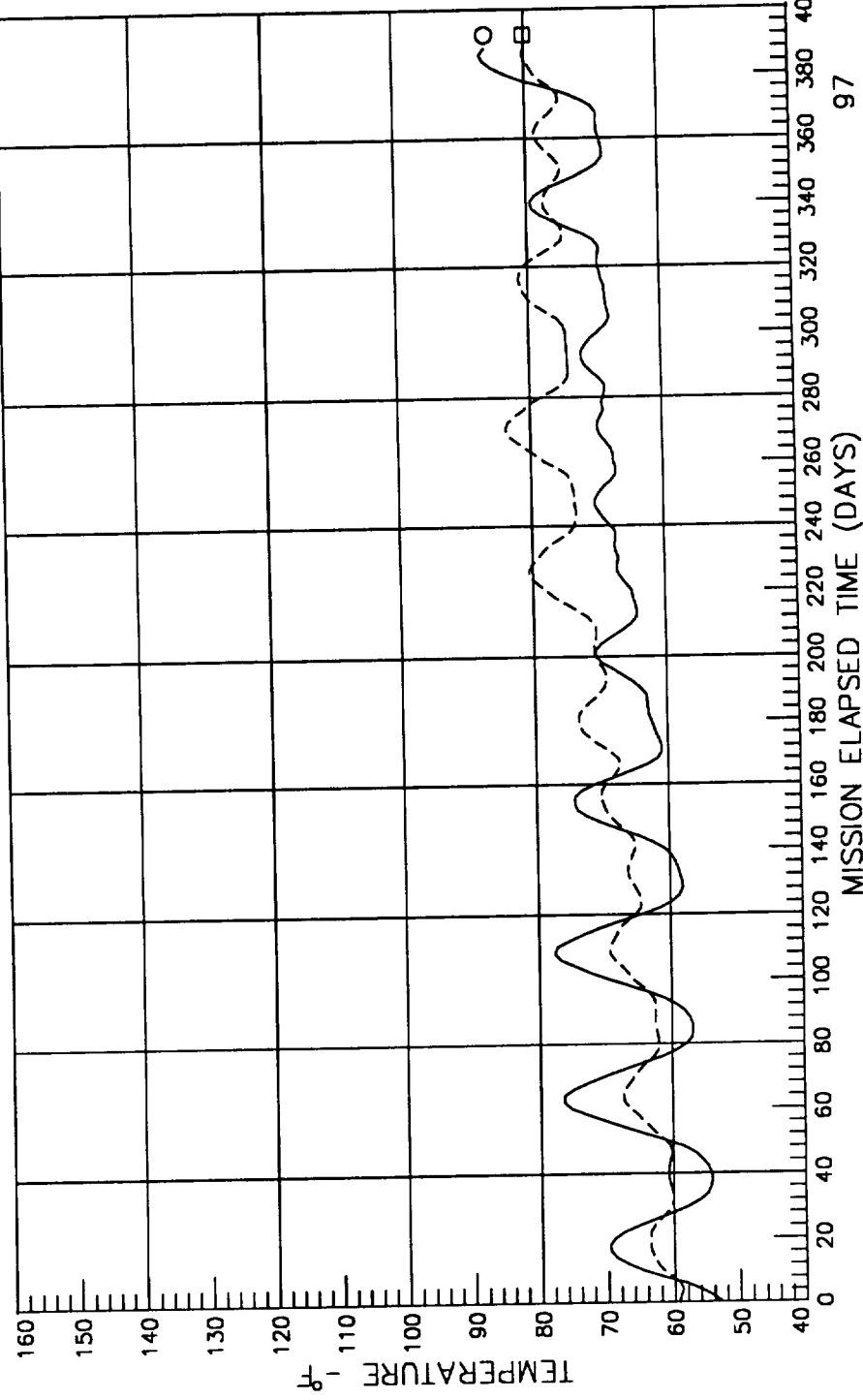


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D3 & E3

SOLAR CONSTANT = 434 BTU/HR-F²
 PLANETARY FLUX = 77 BTU/HR-F²

ALBEDO = .31%
 ALTITUDE = 255 NM
 YAW = 10°

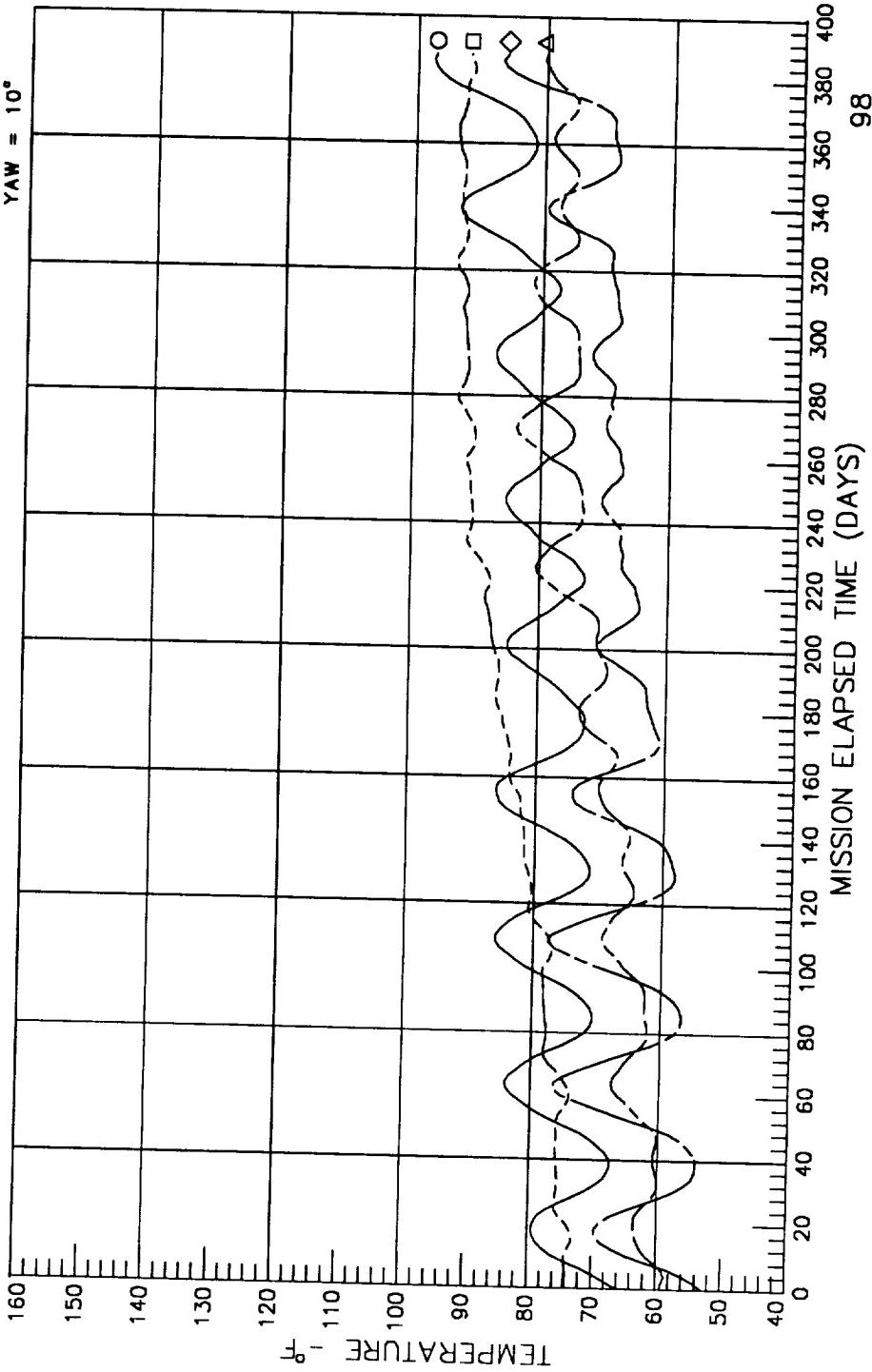
— 242 LONGERON 2-3
 - - - 243 LONGERON 3-4



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F3

○	189 END LONGRN 2-3
□	190 END LONGRN 3-4
◇	242 LONGRON 2-3
△	243 LONGRON 3-4

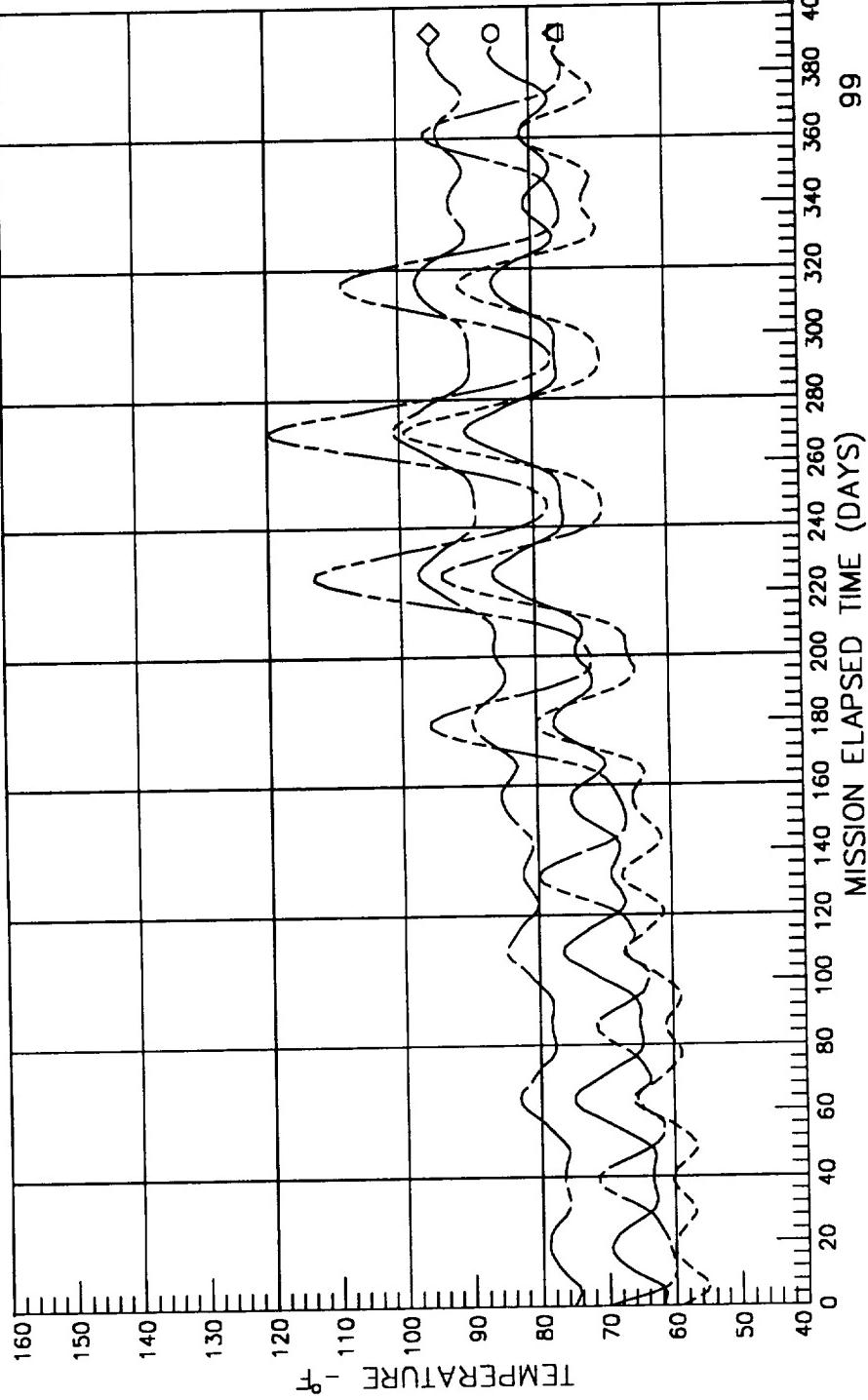
SOLAR CONSTANT = 4.34 BTU/HR-FT²
 PLANETARY FLUX = .77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



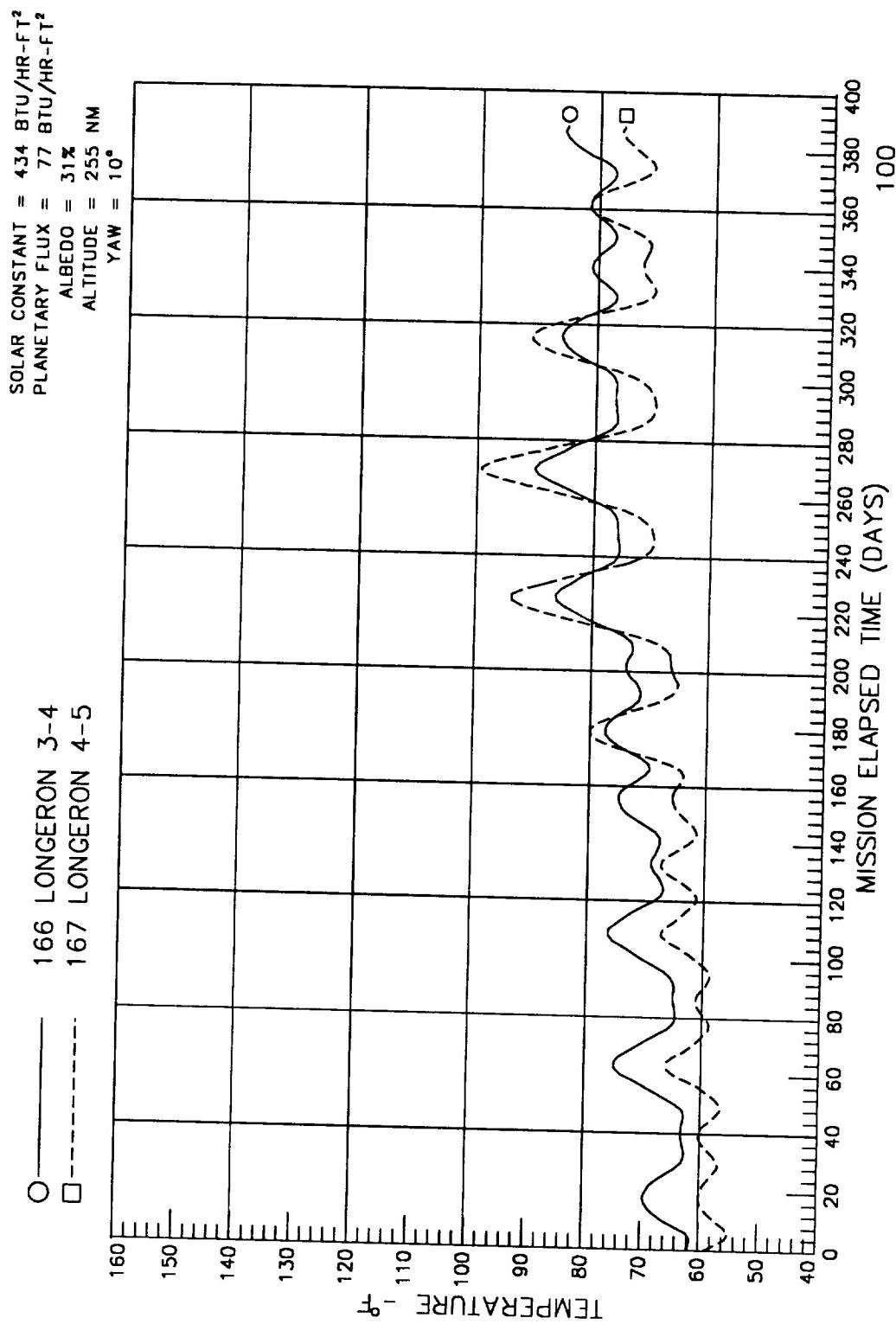
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A4

166 LONGERON 3-4
 167 LONGERON 4-5
 178 END LONGRN 3-4
 179 END LONGRN 4-5

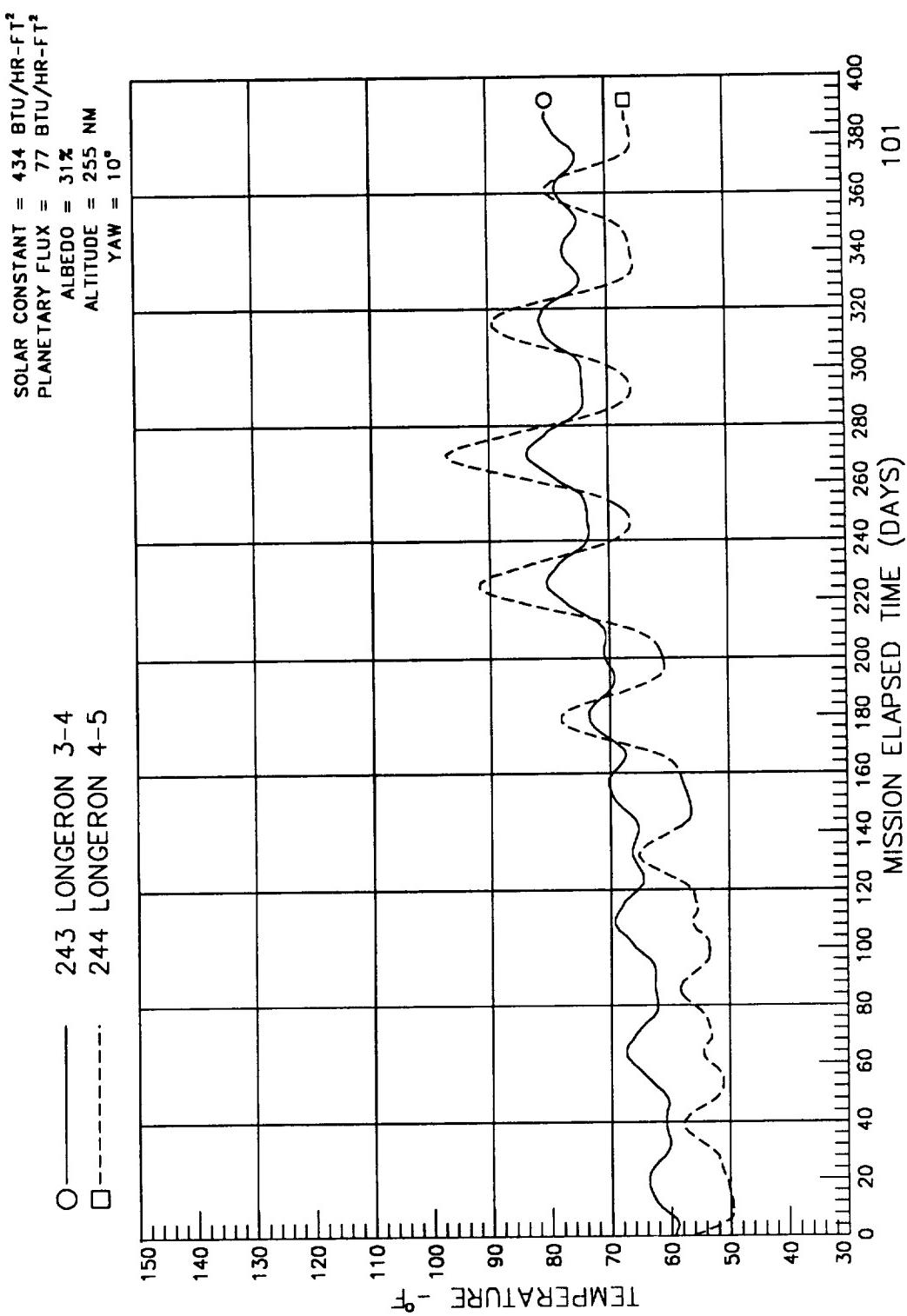
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



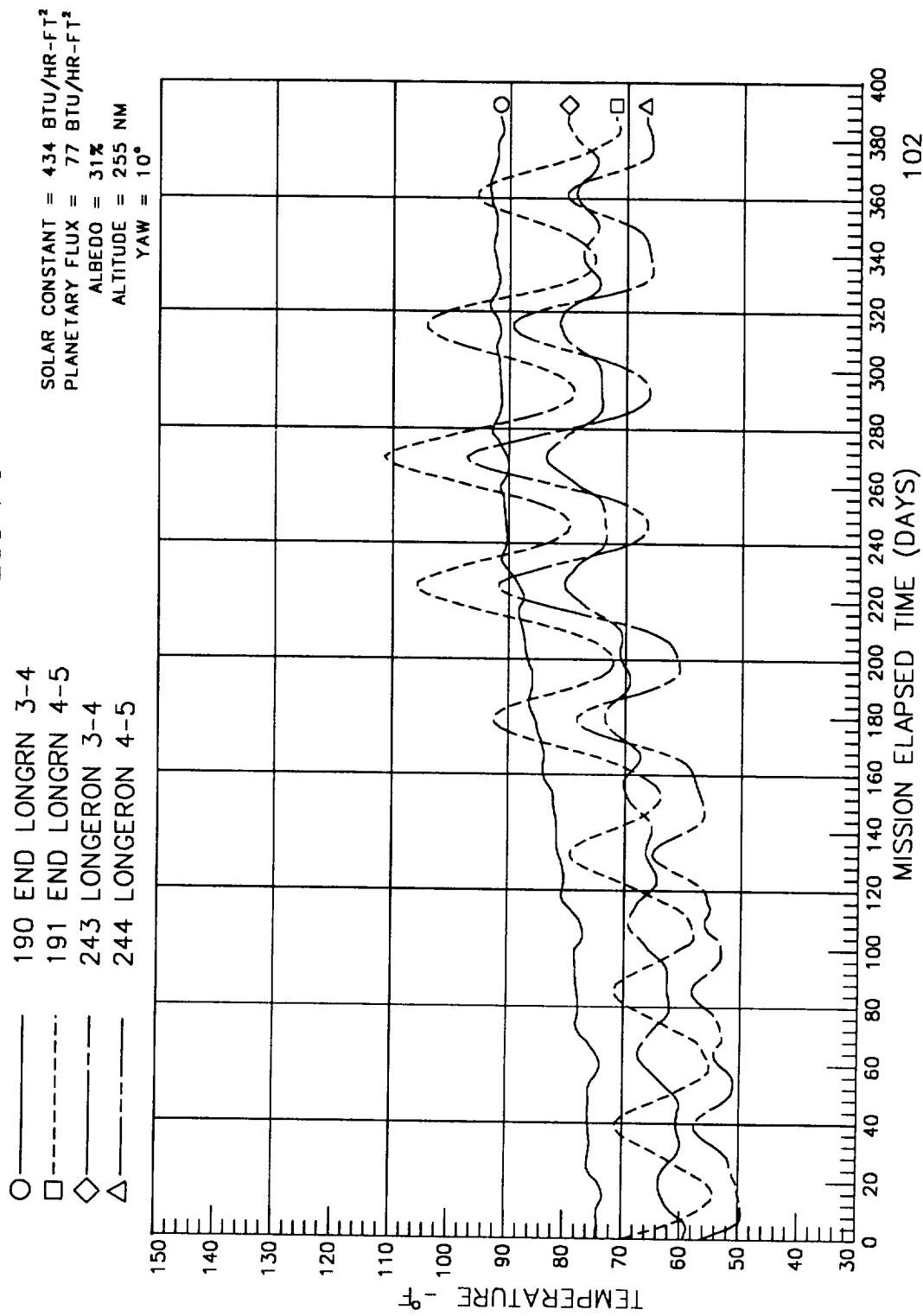
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B4 & C4



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D4 & E4



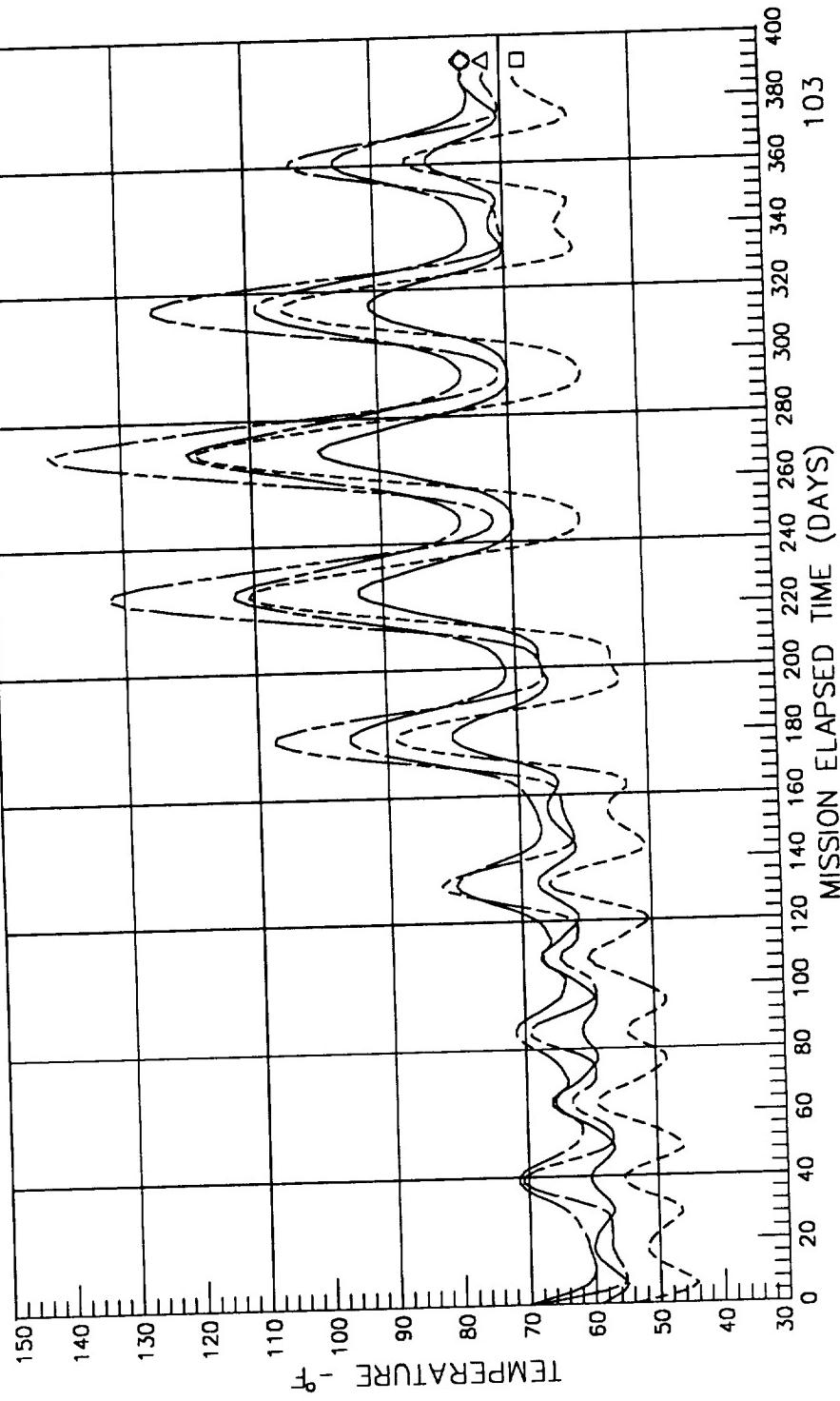
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F4



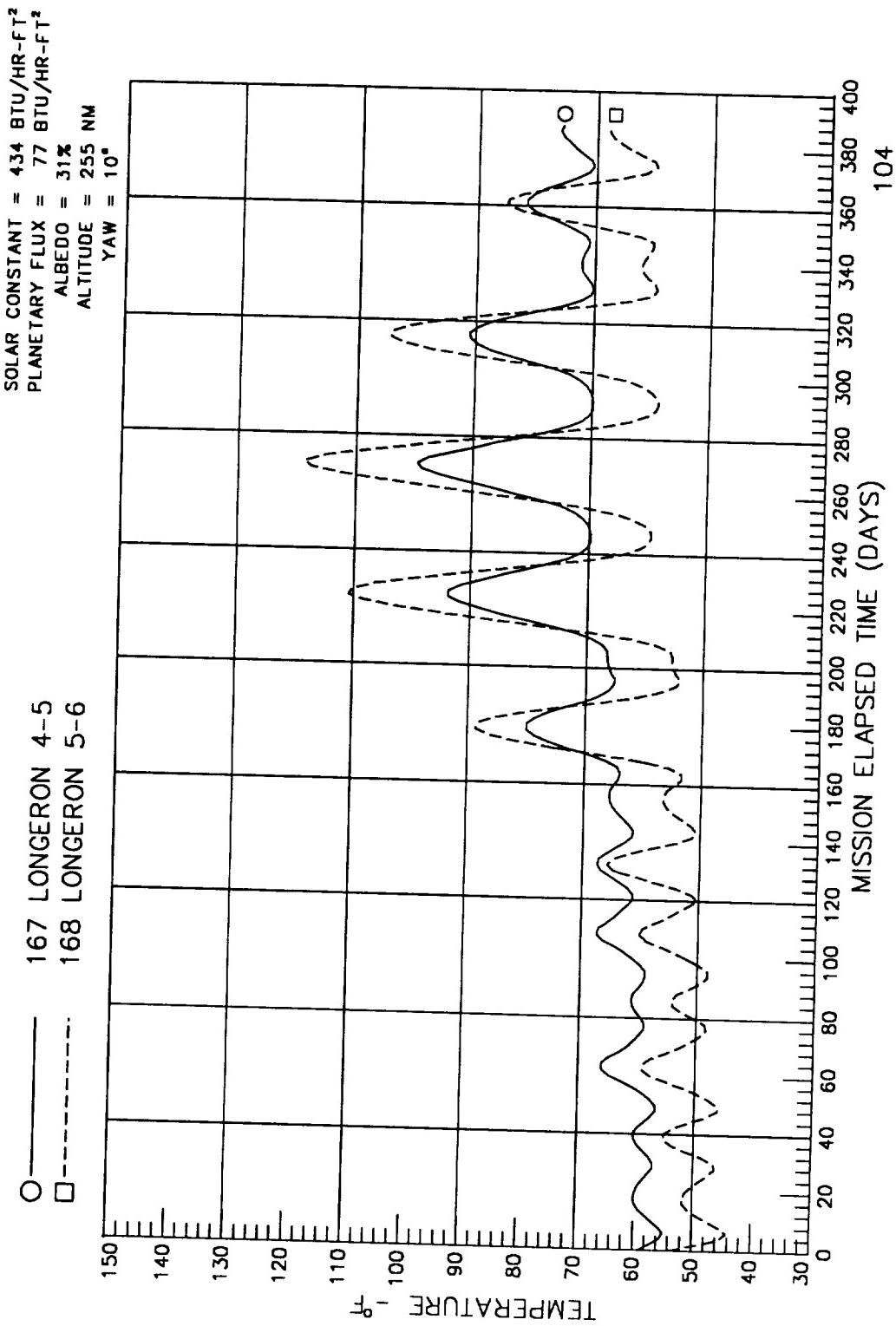
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A5

167 LONGRON 4-5
 168 LONGRON 5-6
 179 END LONGRN 4-5
 180 END LONGRN 5-6

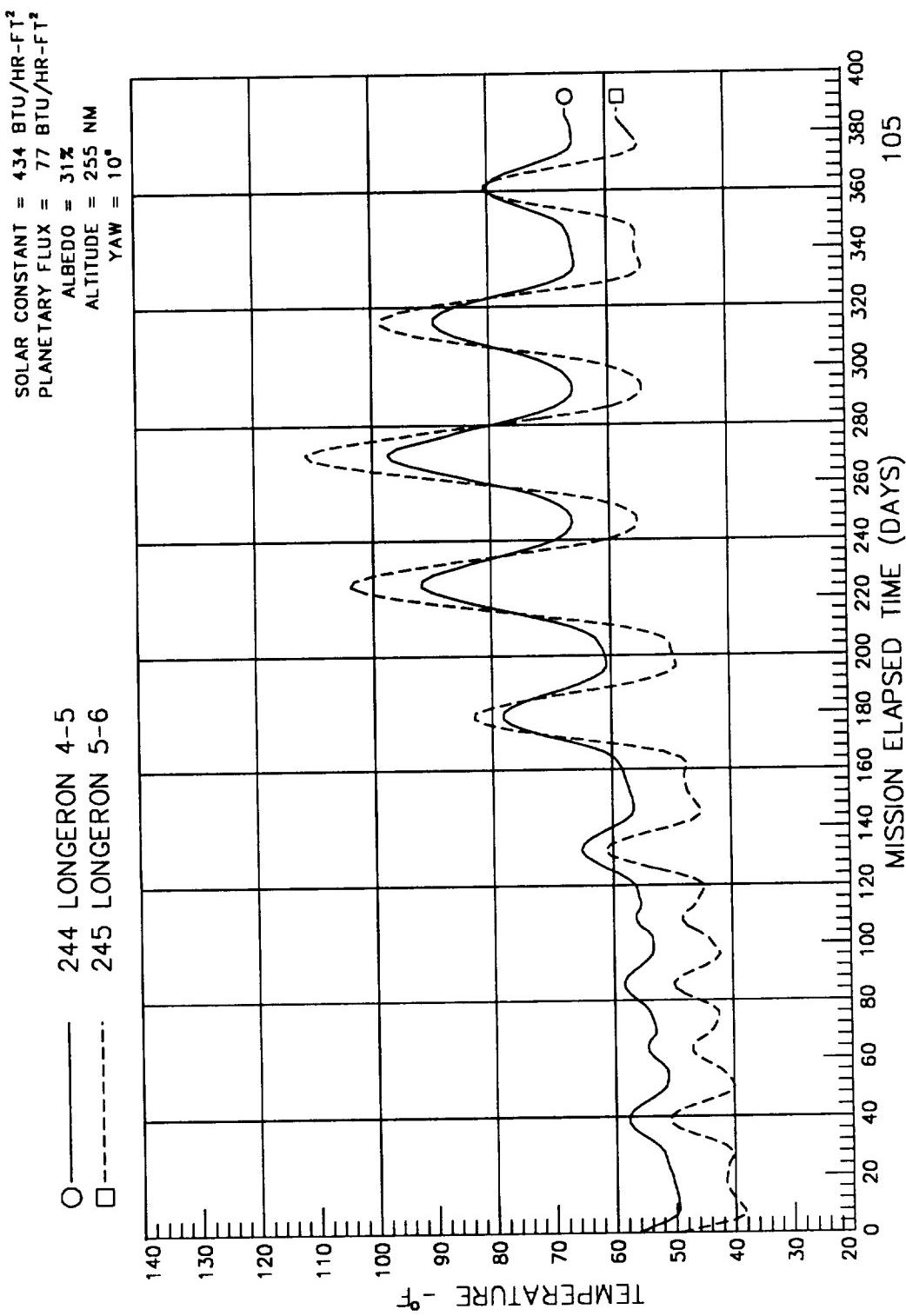
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



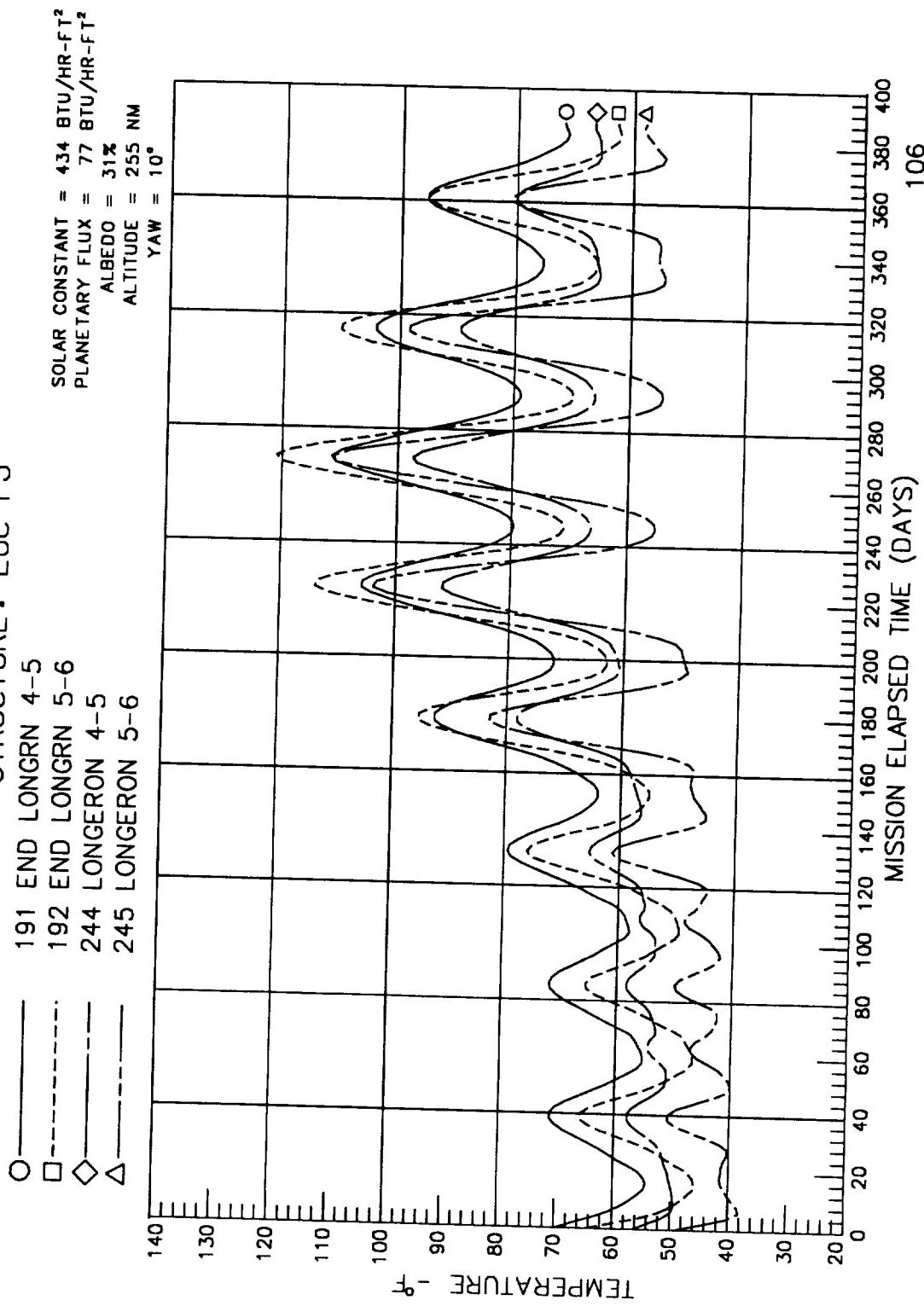
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B5 & C5



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC D5 & E5

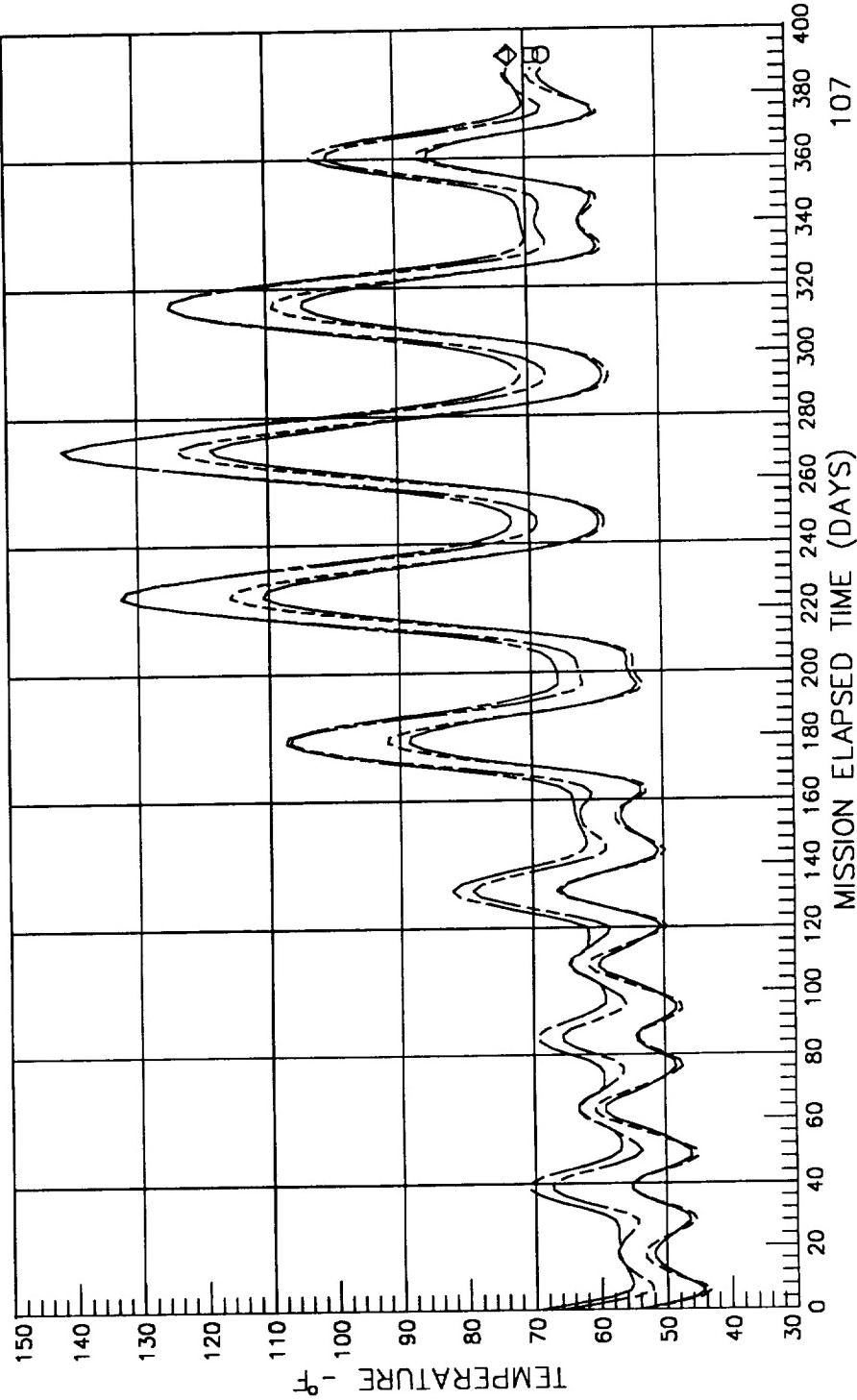


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F5



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC A6

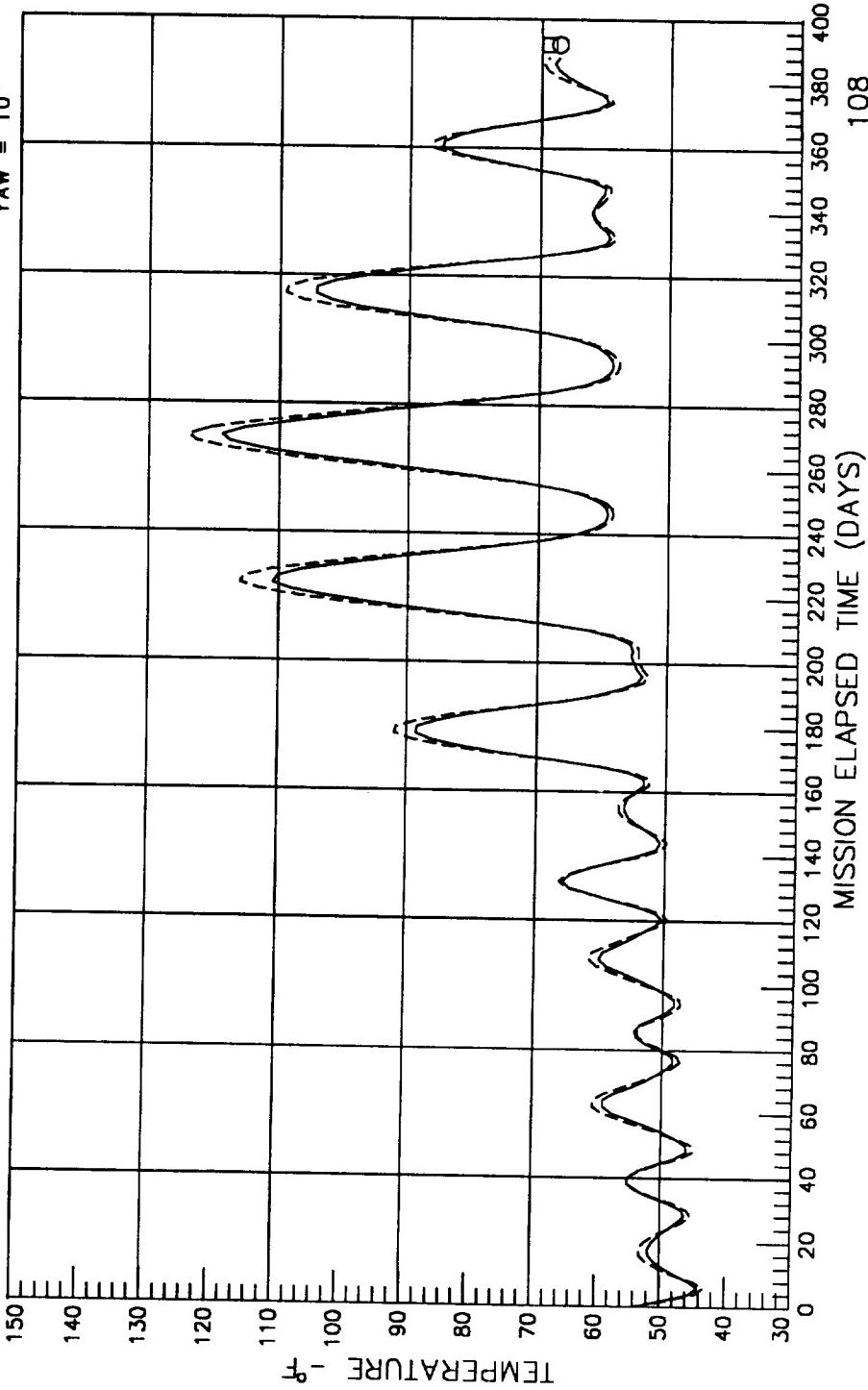
○	168 LONGERON 5-6	SOLAR CONSTANT = 434 BTU/HR-FT ²
□	169 LONGERON 6-7	PLANETARY FLUX = 77 BTU/HR-FT ²
◇	180 END LONGRN 5-6	ALBEDO = 31%
△	181 END LONGRN 6-7	ALTITUDE = 255 NM
		YAW = 10°



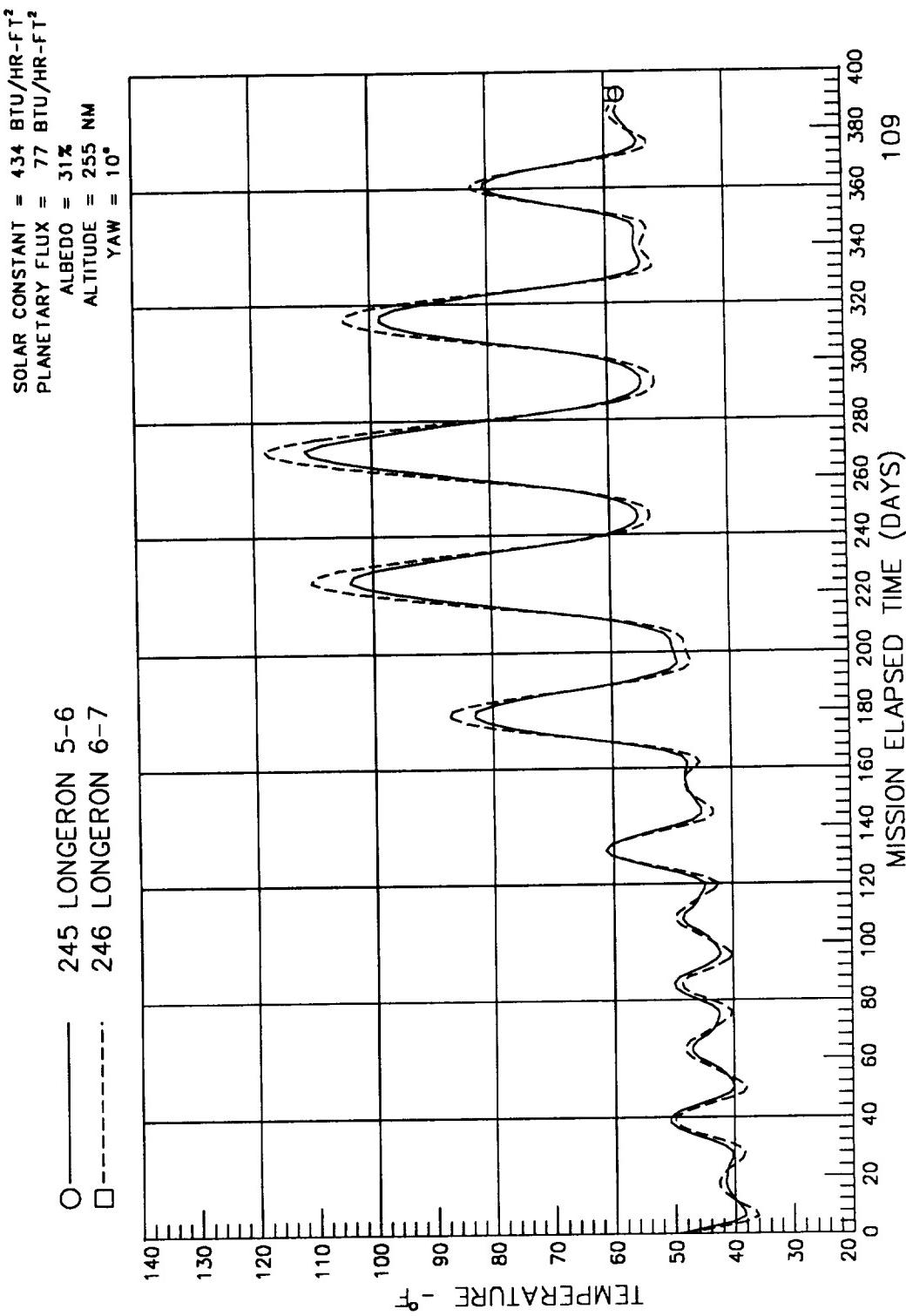
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B6 & C6

○----- 168 LONGERON 5-6
 □----- 169 LONGERON 6-7

SOLAR CONSTANT = 4.34 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC D6 & E6



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F6

○ -----	192 END LONGRN 5-6
□ -----	193 END LONGRN 6-7
◇ -----	245 LONGRON 5-6
△ -----	246 LONGRON 6-7

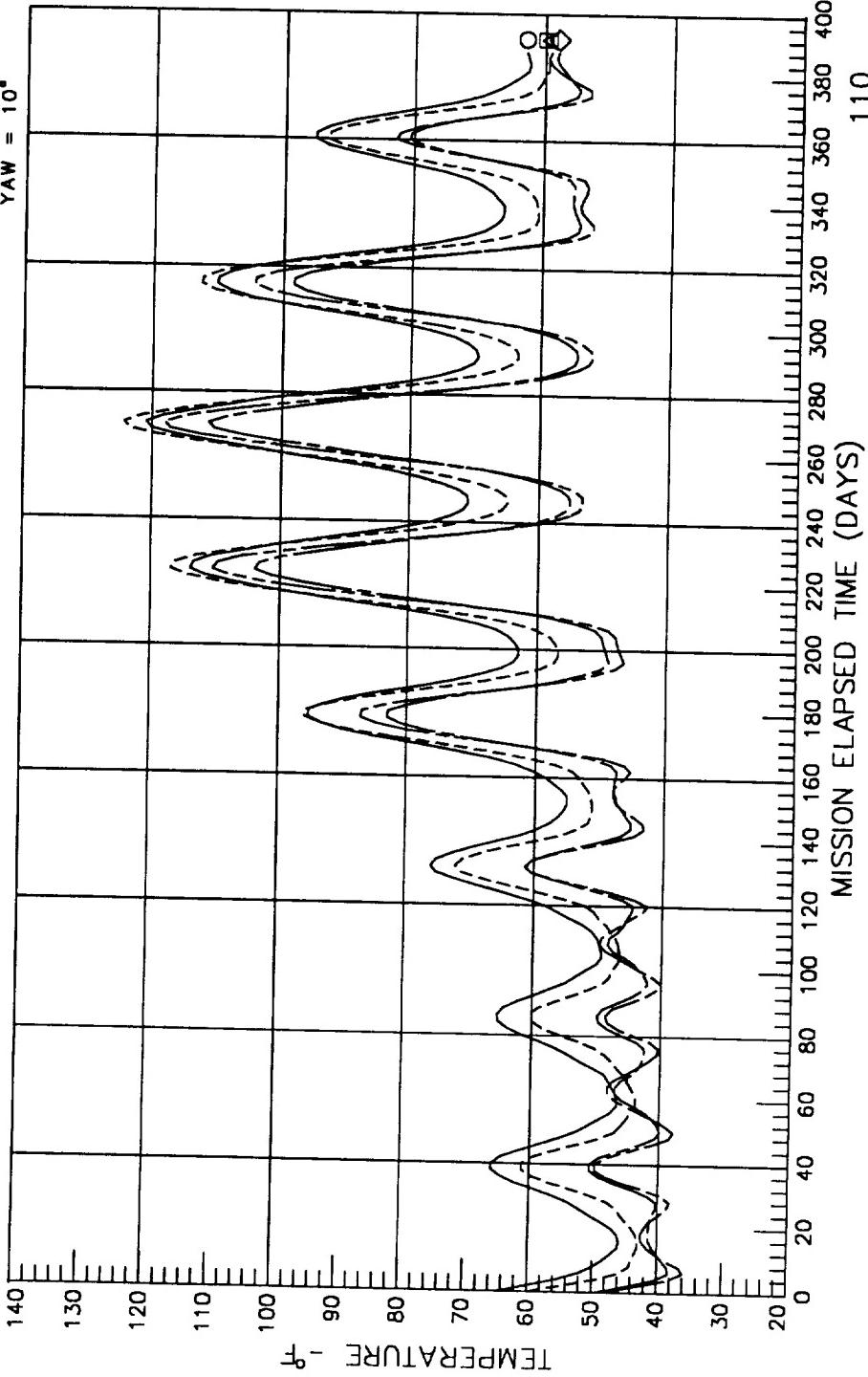
SOLAR CONSTANT = 434 BTU/HR-F²

PLANETARY FLUX = 77 BTU/HR-F²

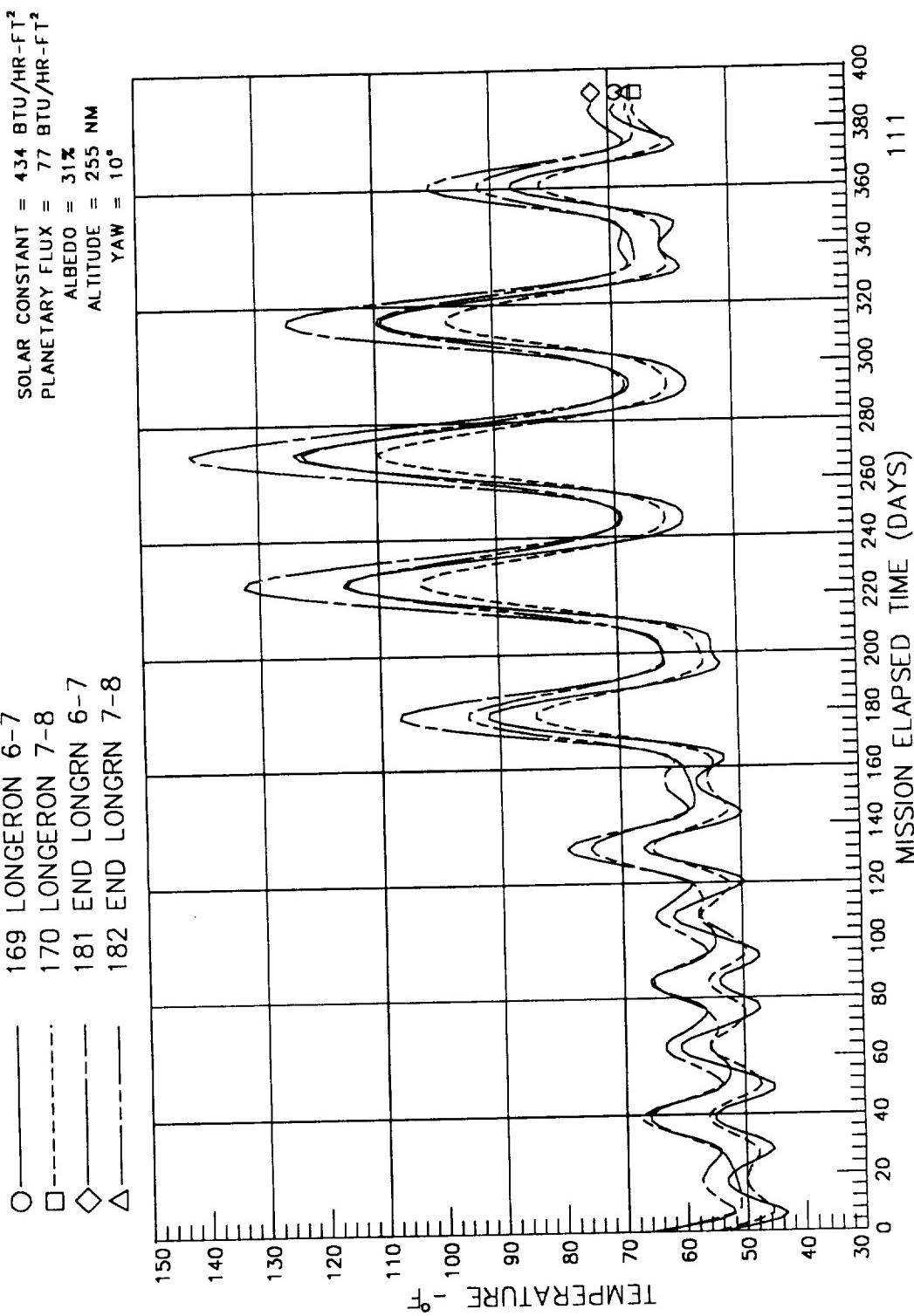
ALBEDO = 31%

ALTITUDE = 255 NM

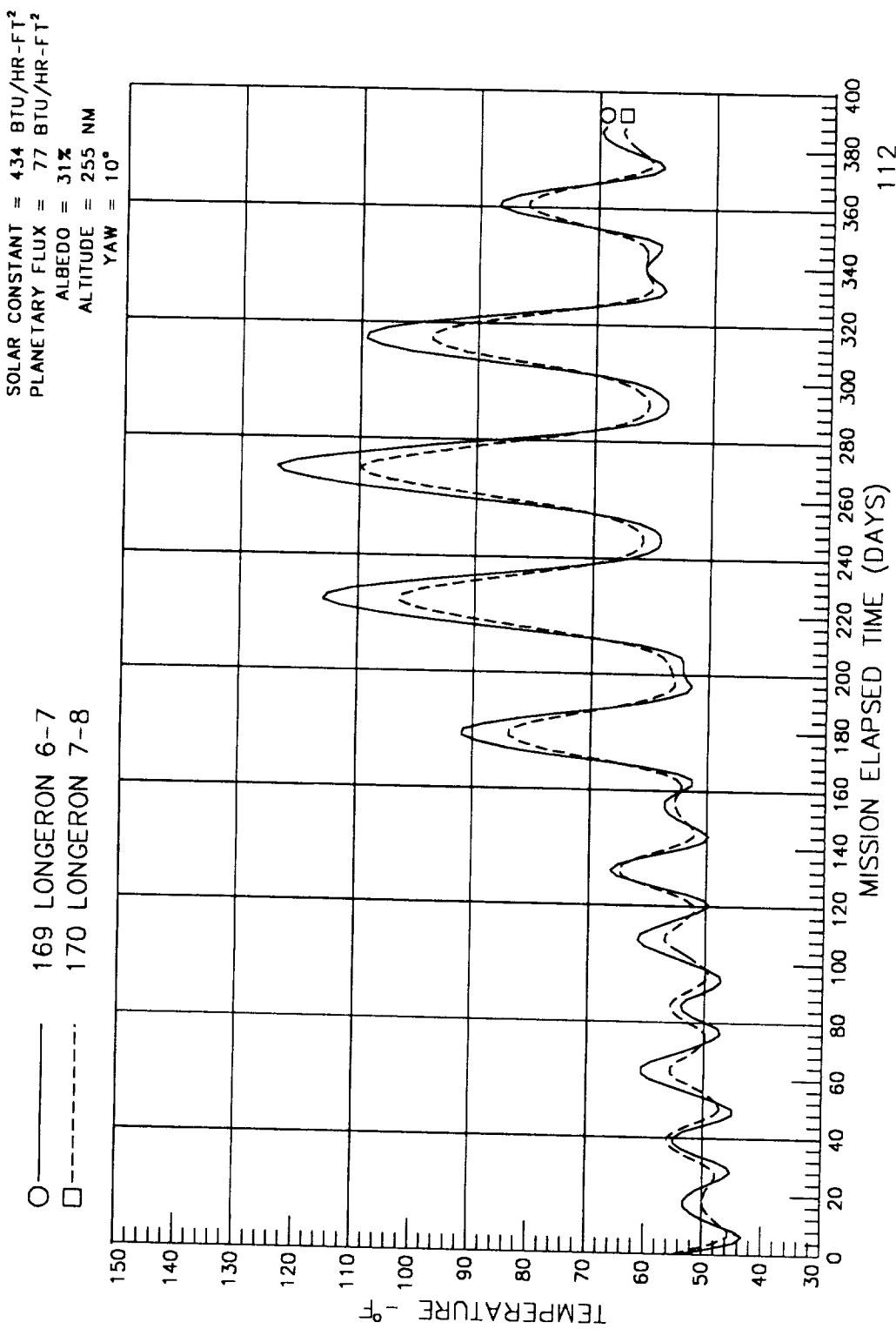
YAW = 10°



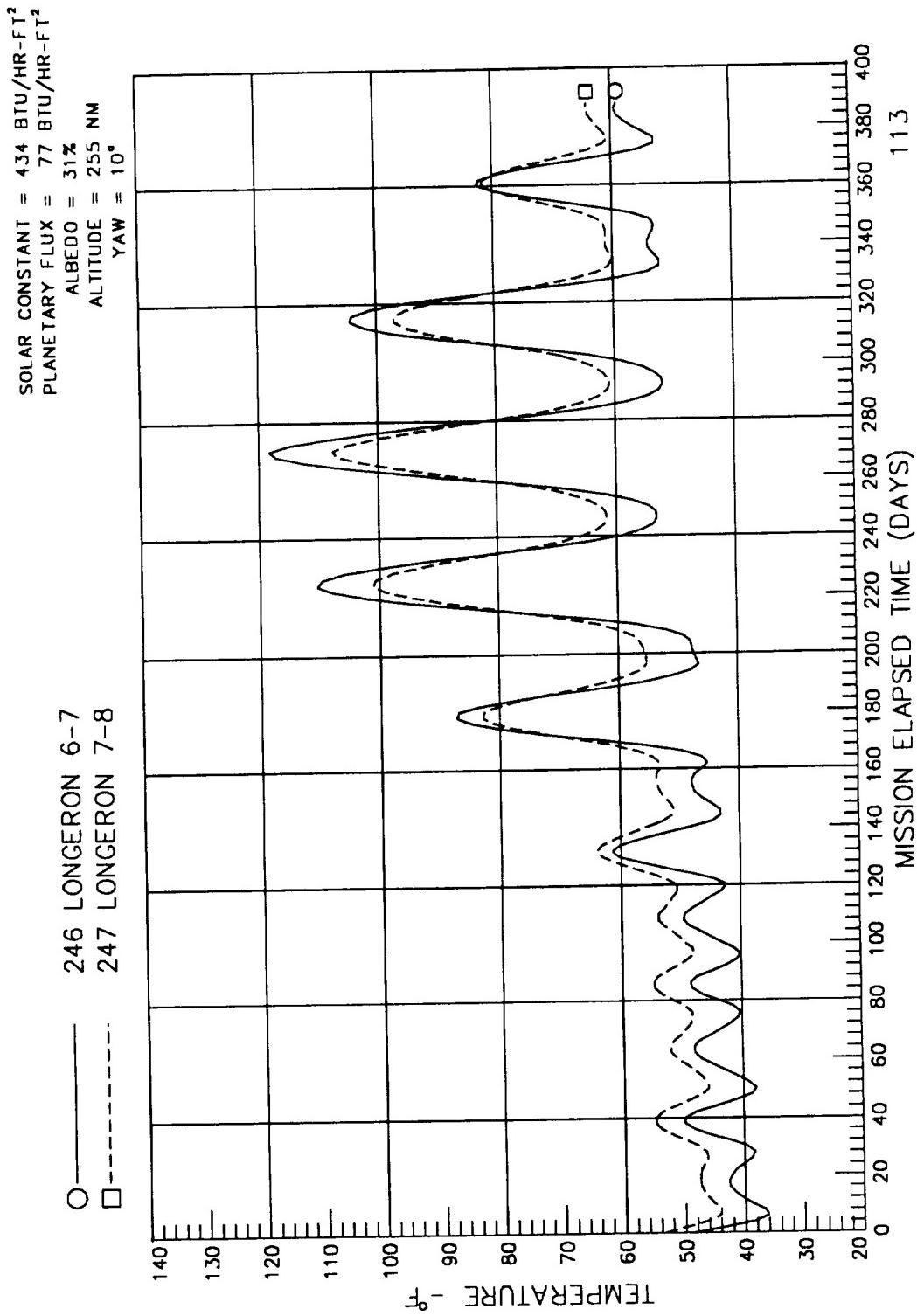
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A7



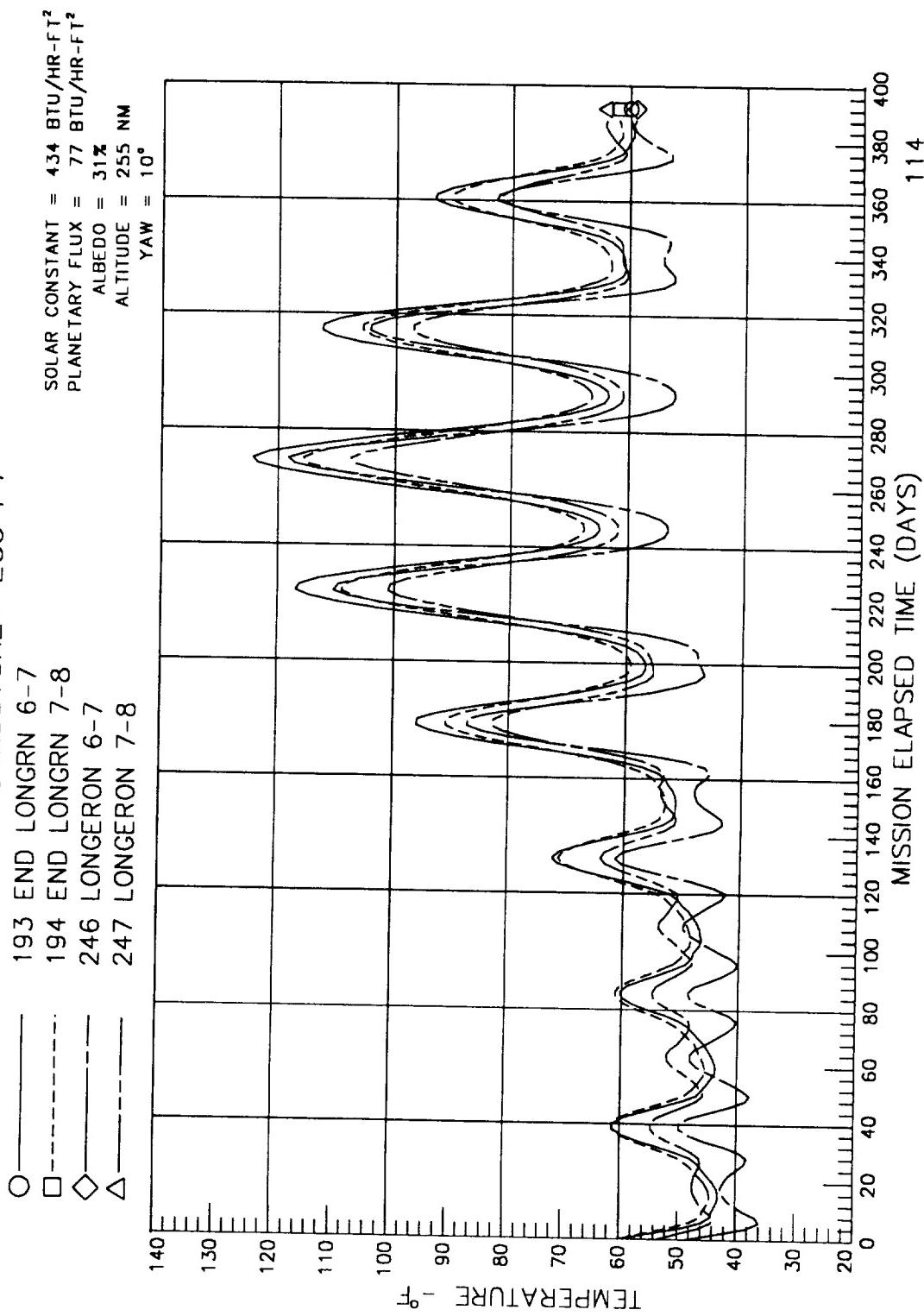
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC B7 & C7



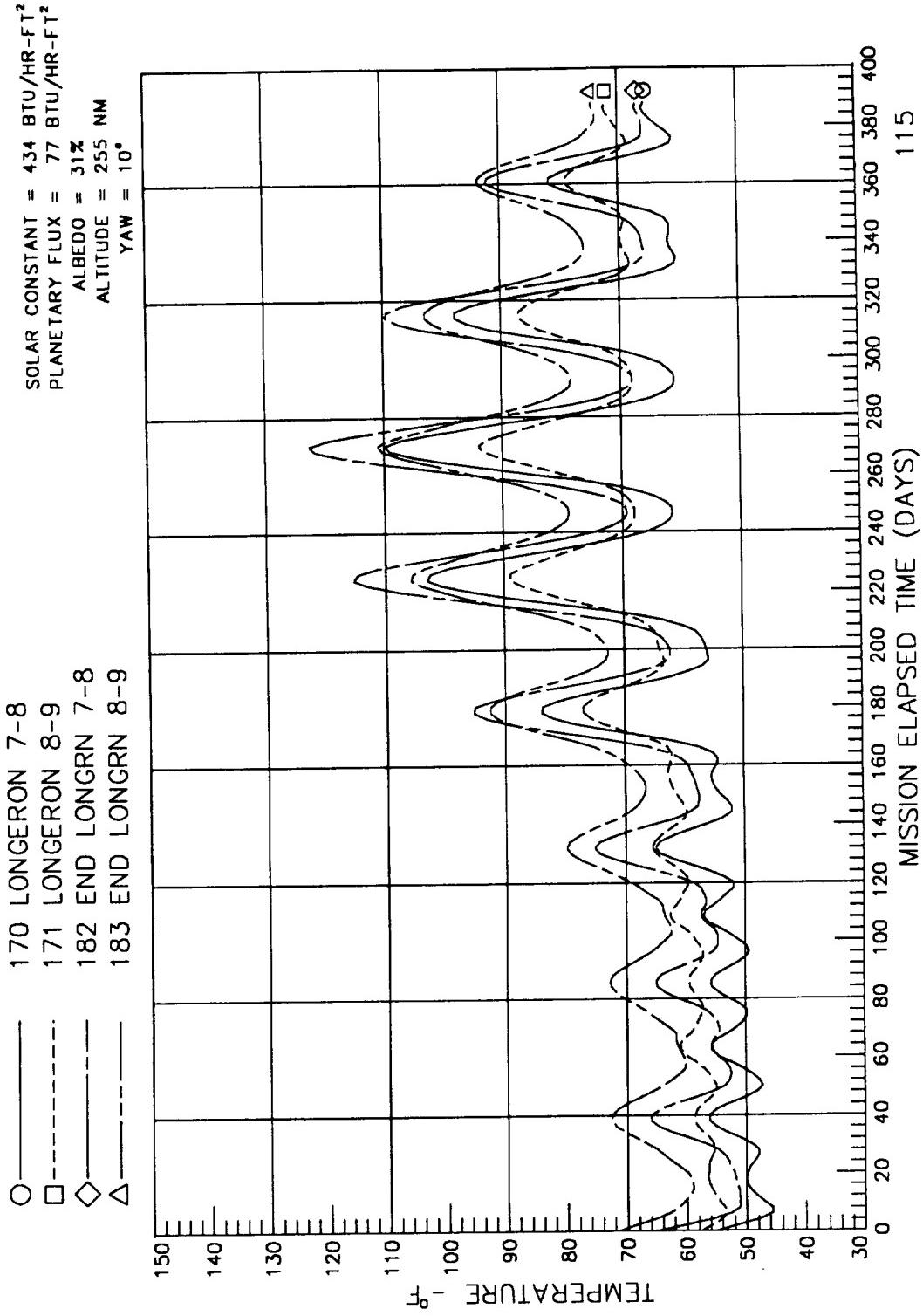
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC 07 & E7



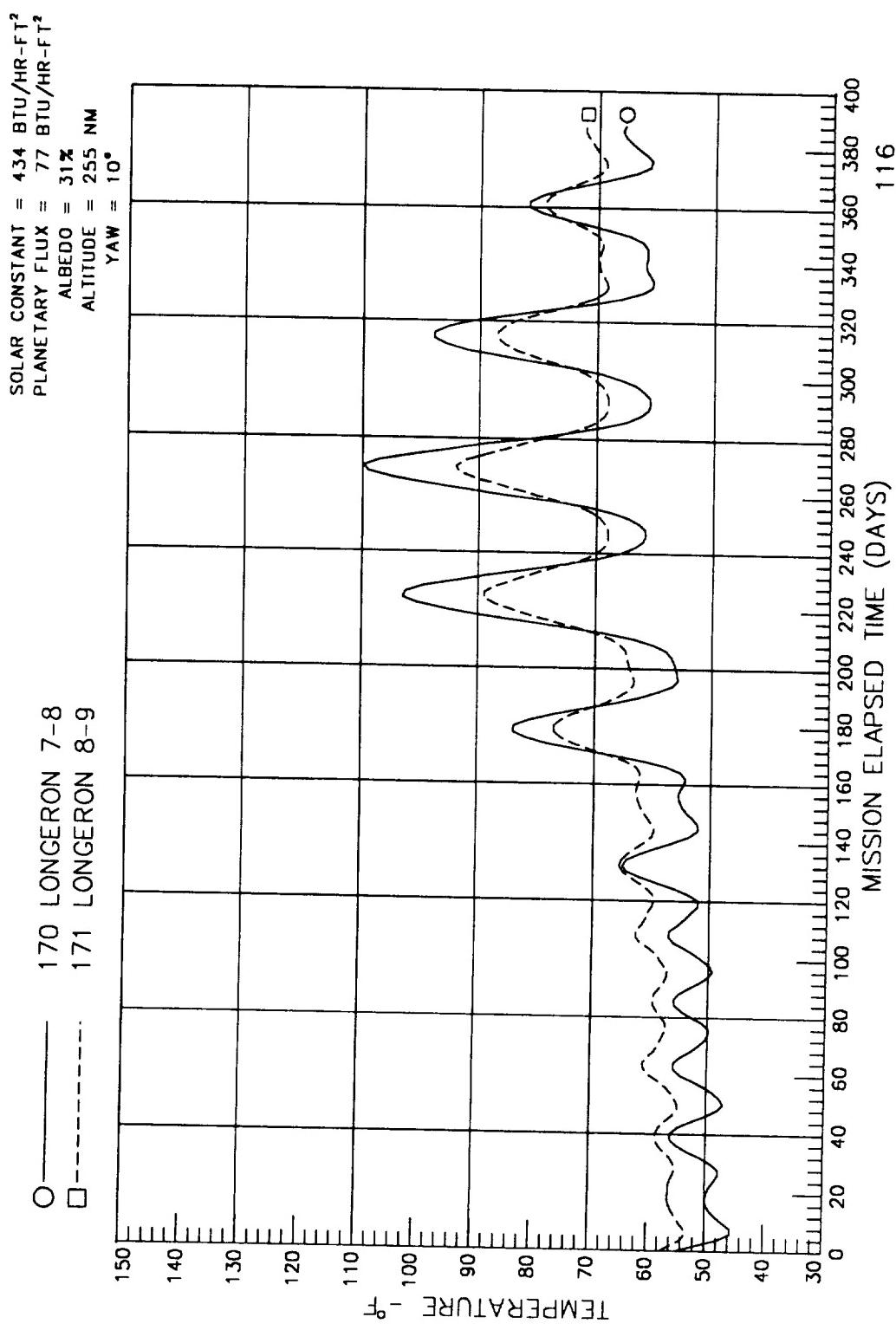
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F7



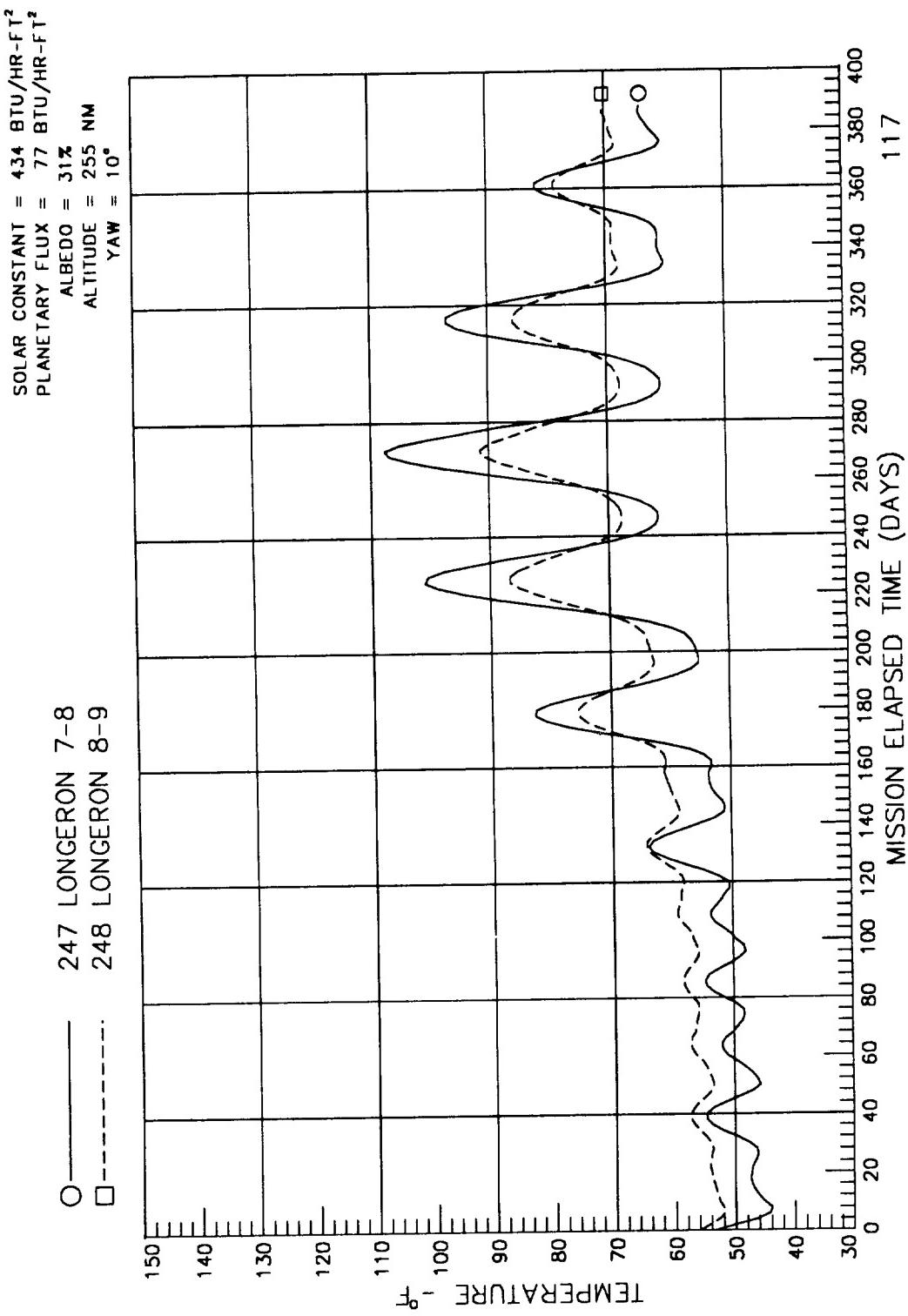
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC A8



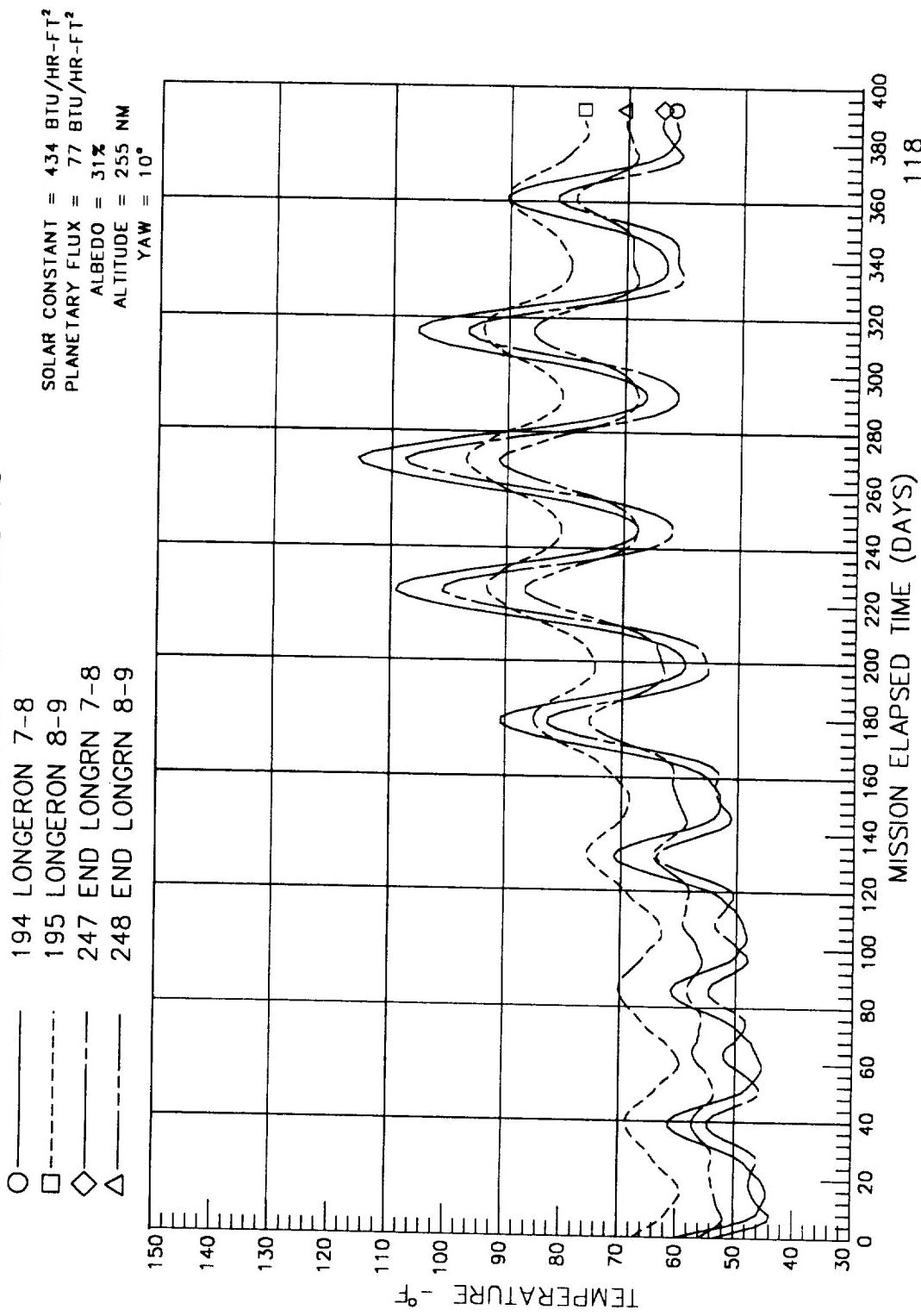
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B8 & C8



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D8 & E8



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE: LOC F8



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE : LOC A9

○ -----	171 LONGERON 8-9
□ -----	172 LONGERON 9-10
◇ -----	183 END LONGRN 8-9
△ -----	184 END LONGRN 9-10

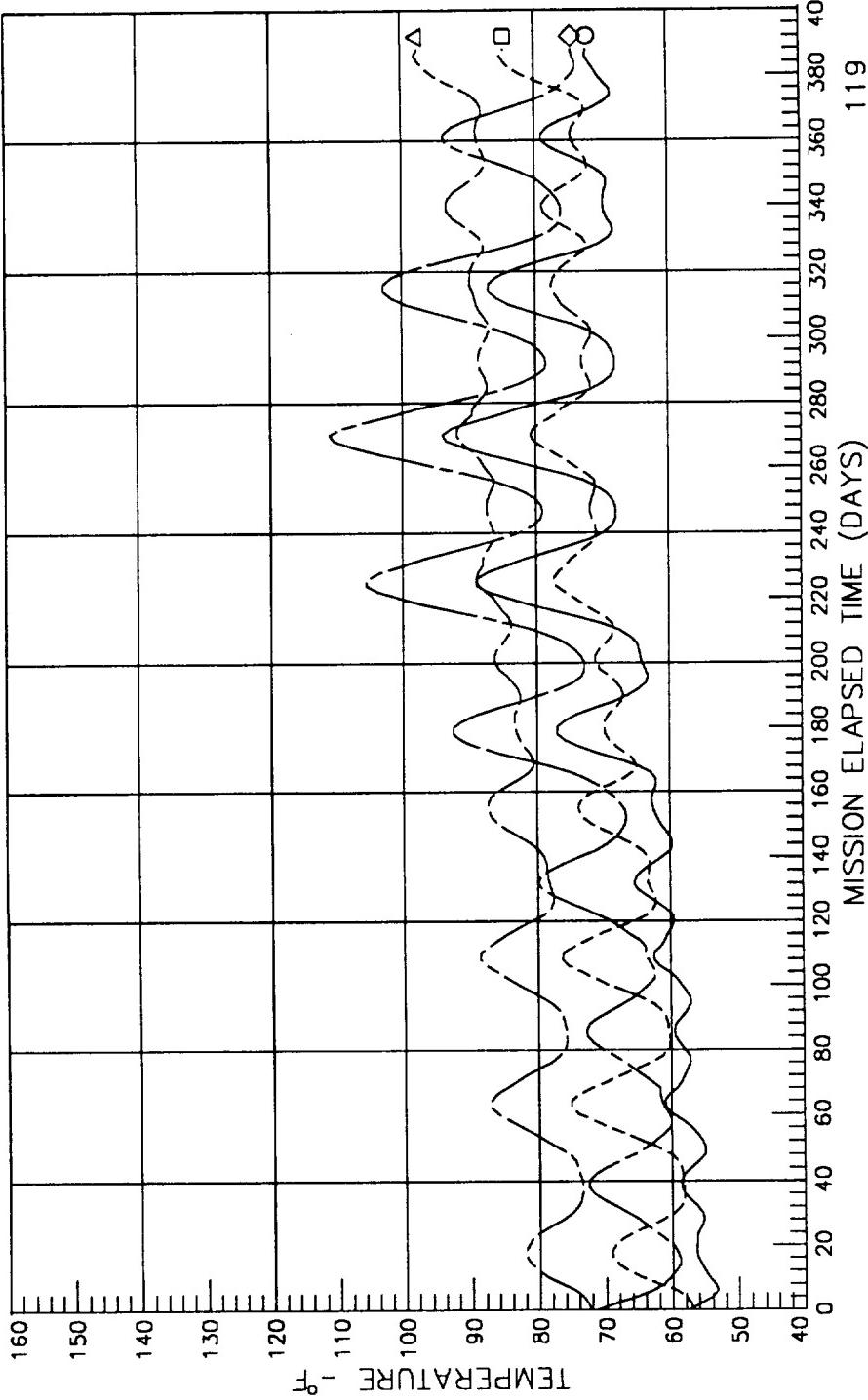
SOLAR CONSTANT = 4.34 BTU/HR-FT²

PLANETARY FLUX = 77 BTU/HR-FT²

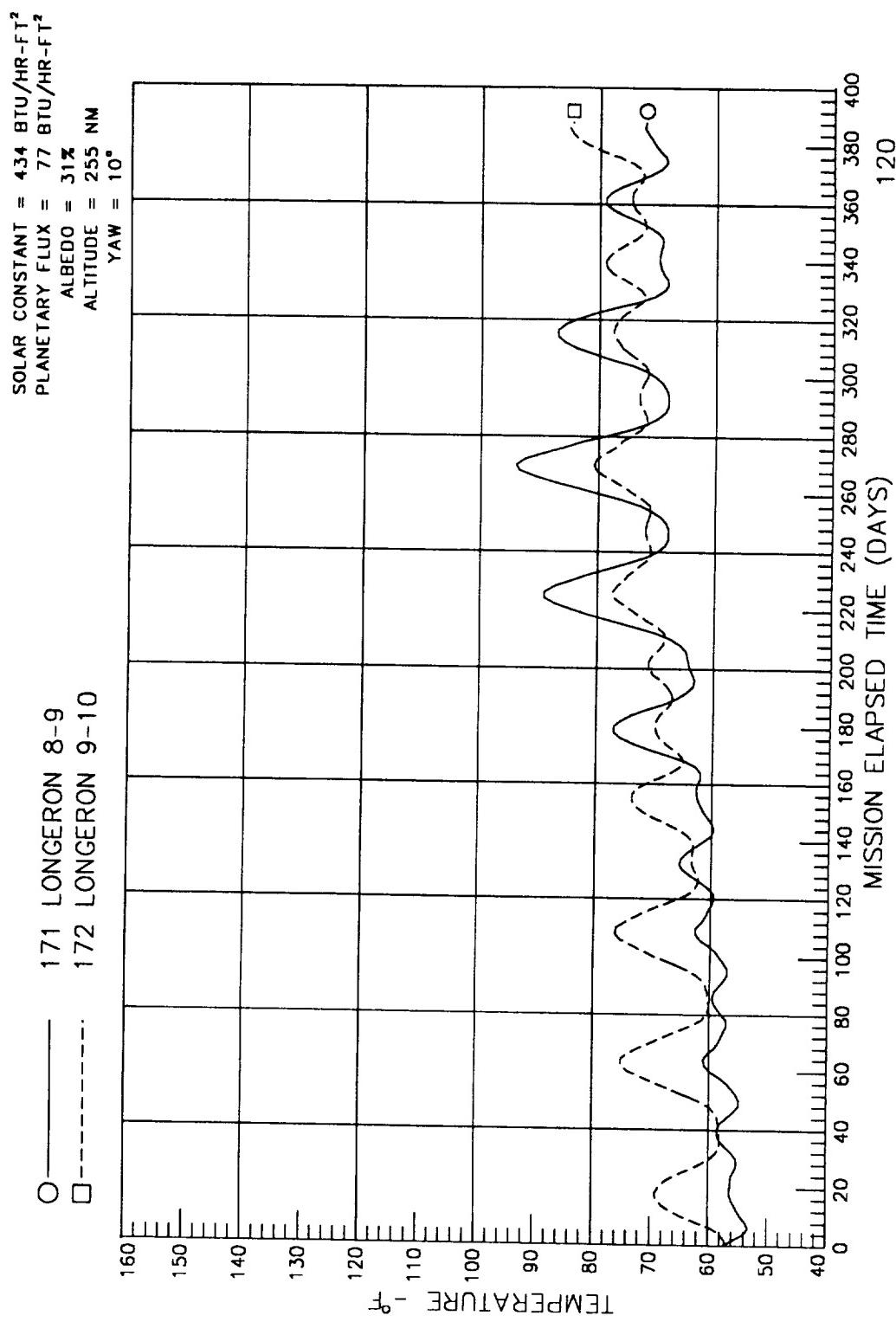
ALBEDO = 31%

ALTITUDE = 255 NM

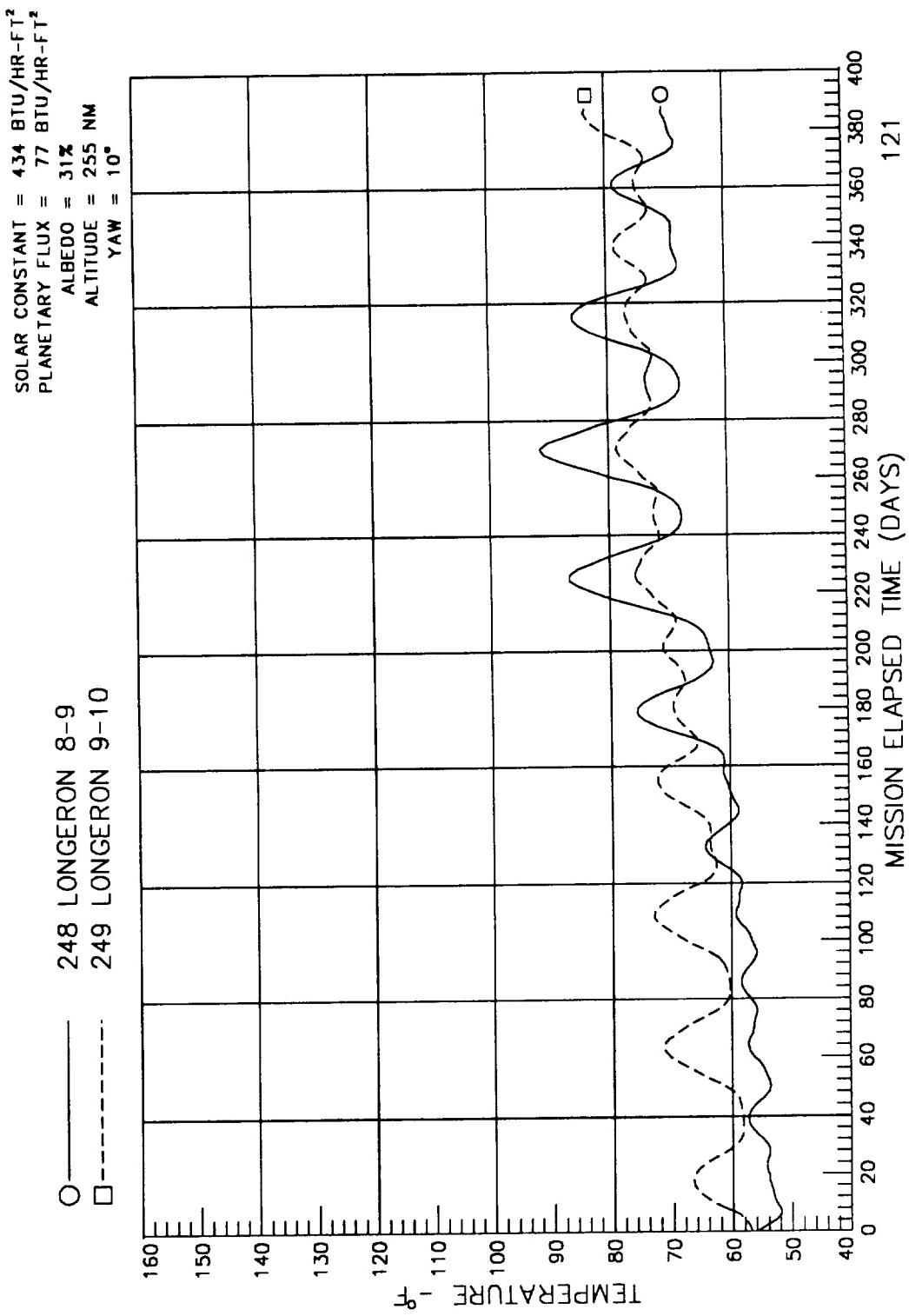
YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B9 & C9



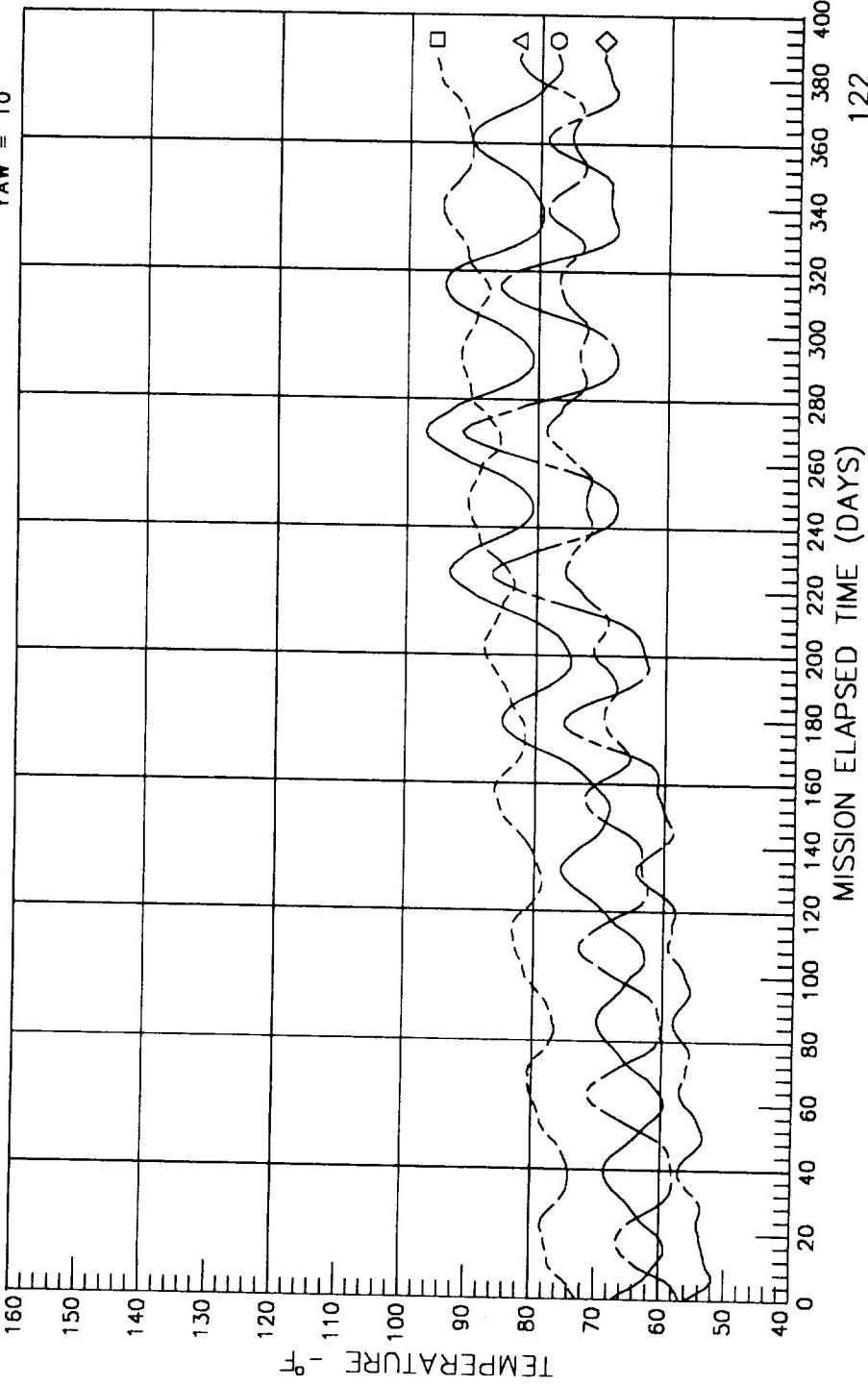
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D9 & E9



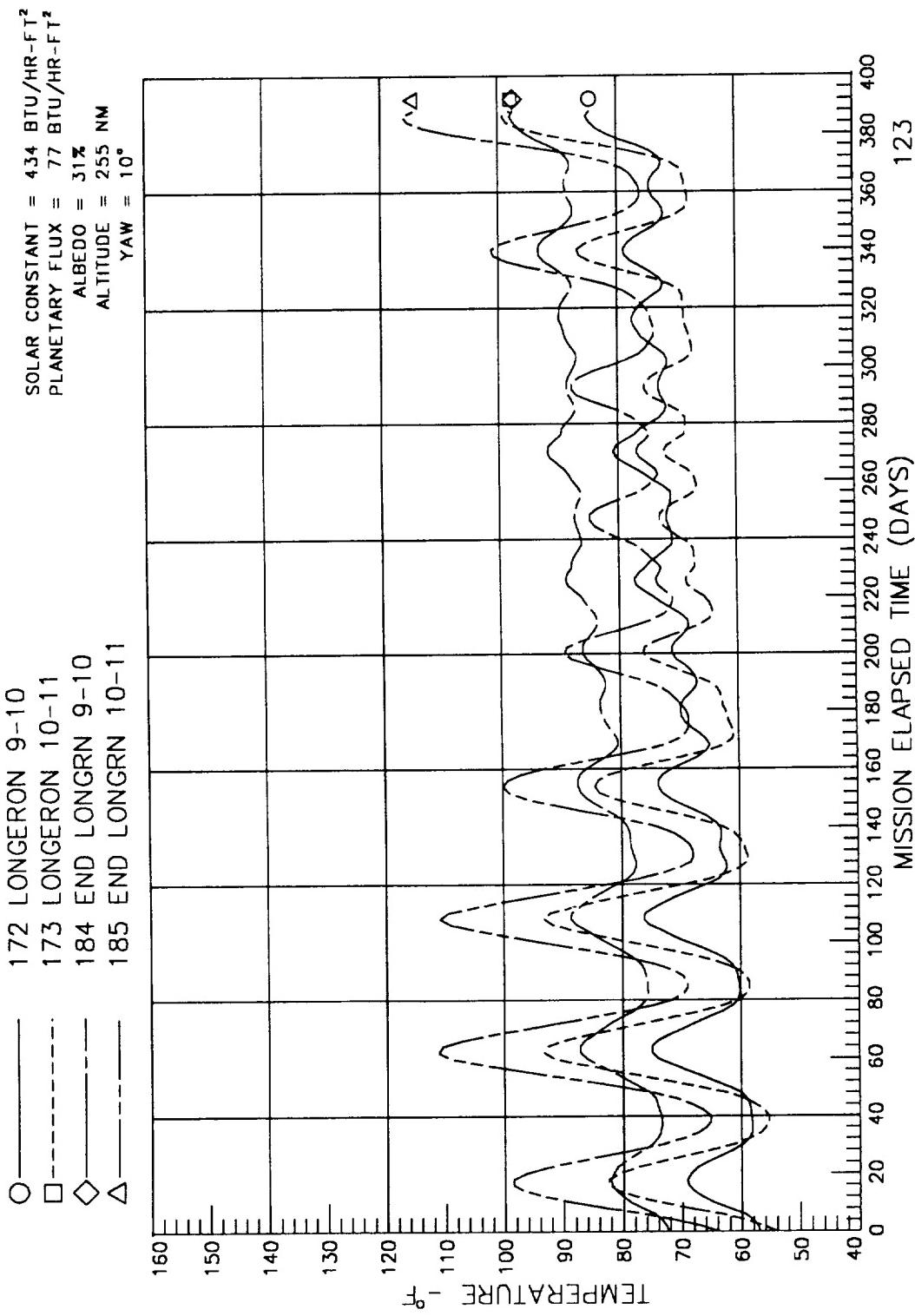
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F9

○ ----- 195 END LONGRN 8-9
 □ ----- 196 END LONGRN 9-10
 ◇ ----- 248 LONGERON 8-9
 △ ----- 249 LONGERON 9-10

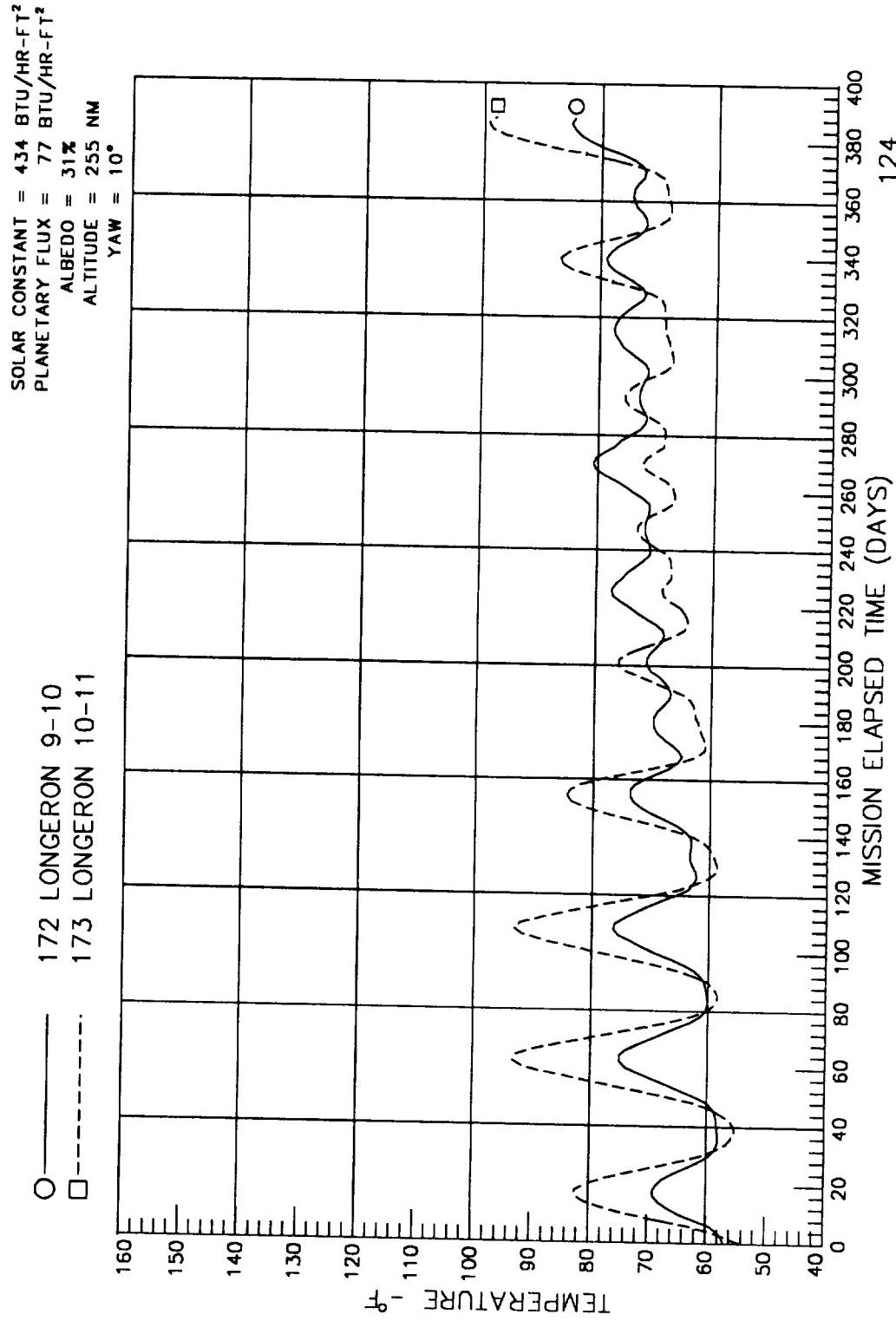
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



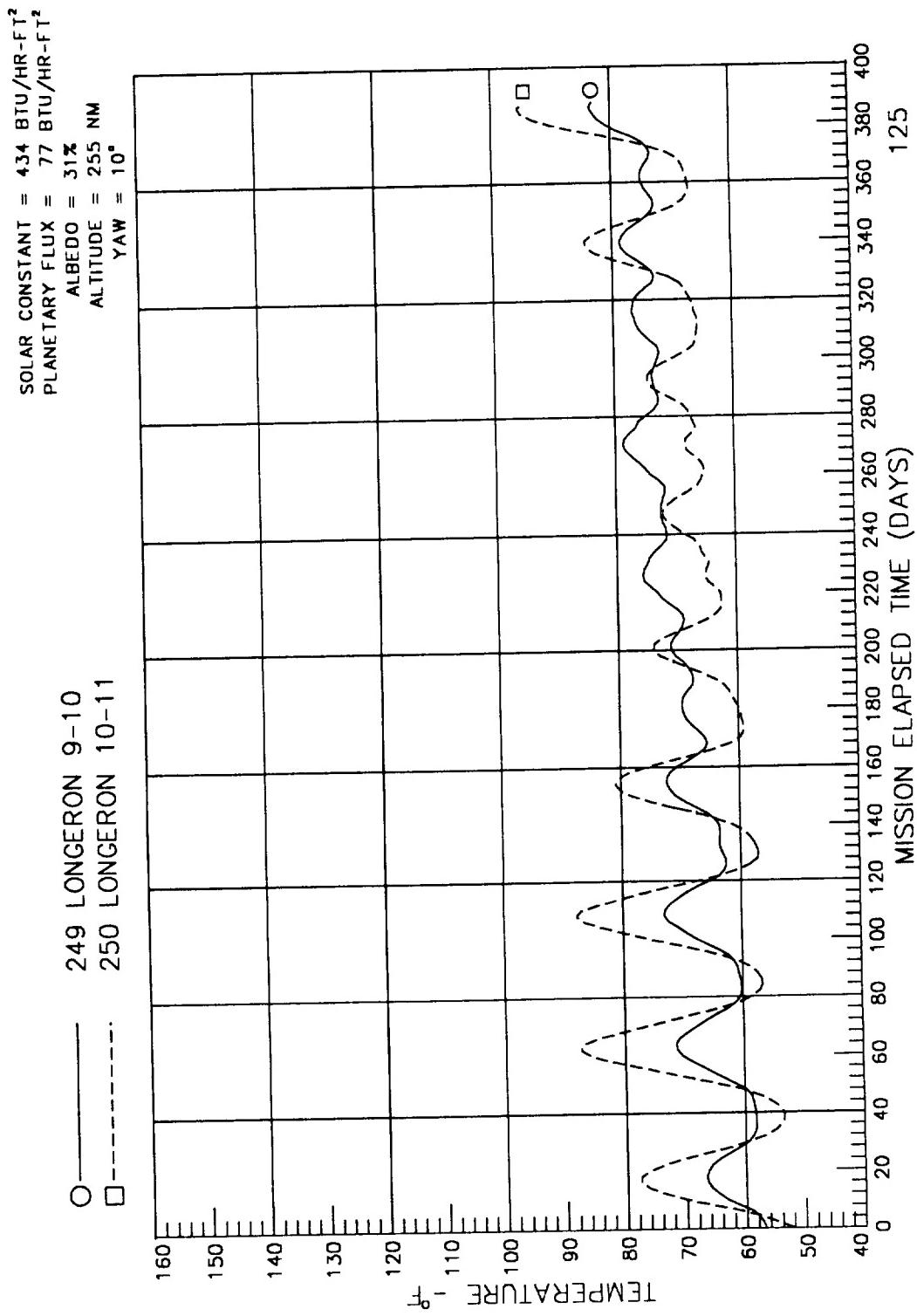
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC A10



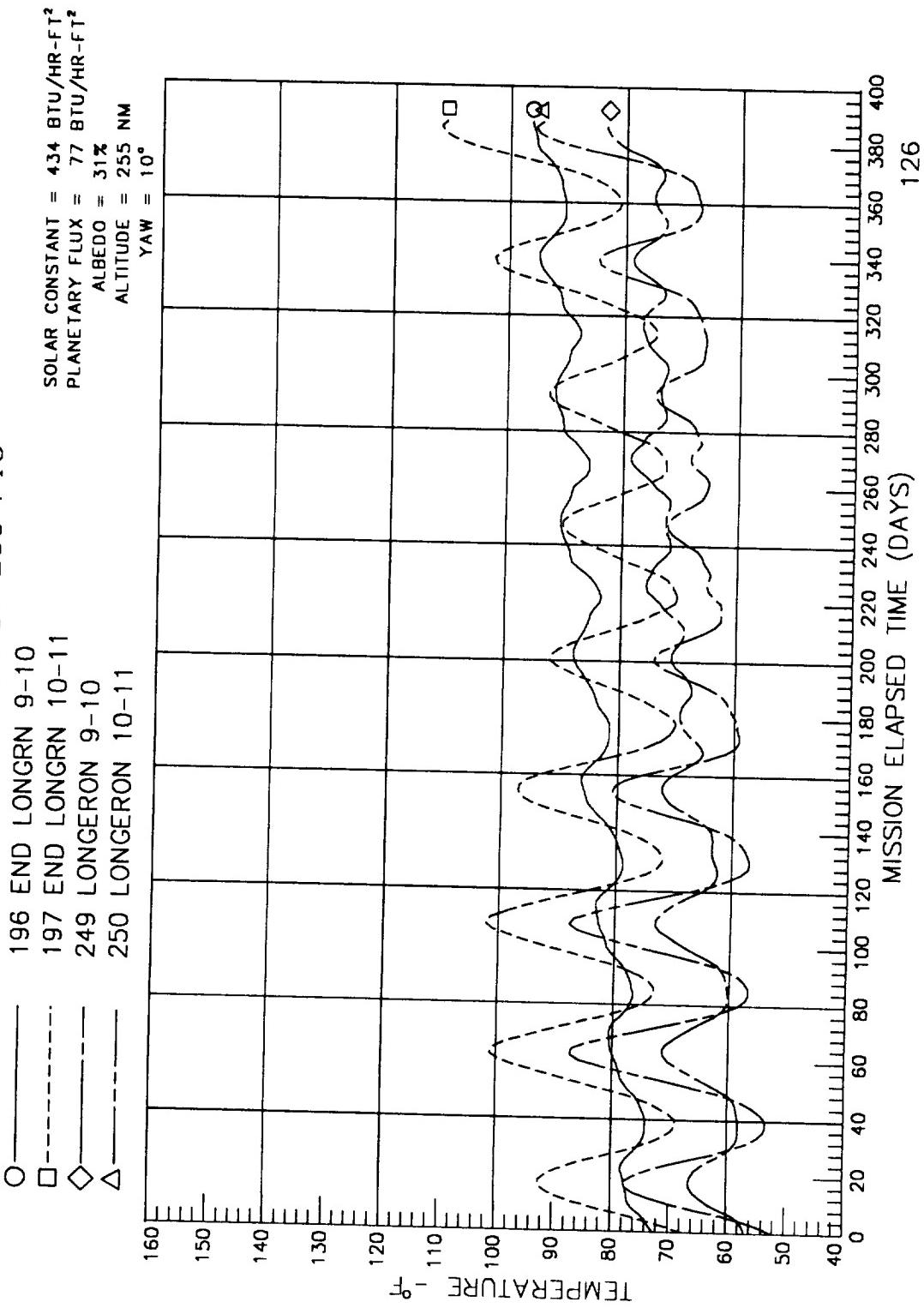
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B10 & C10



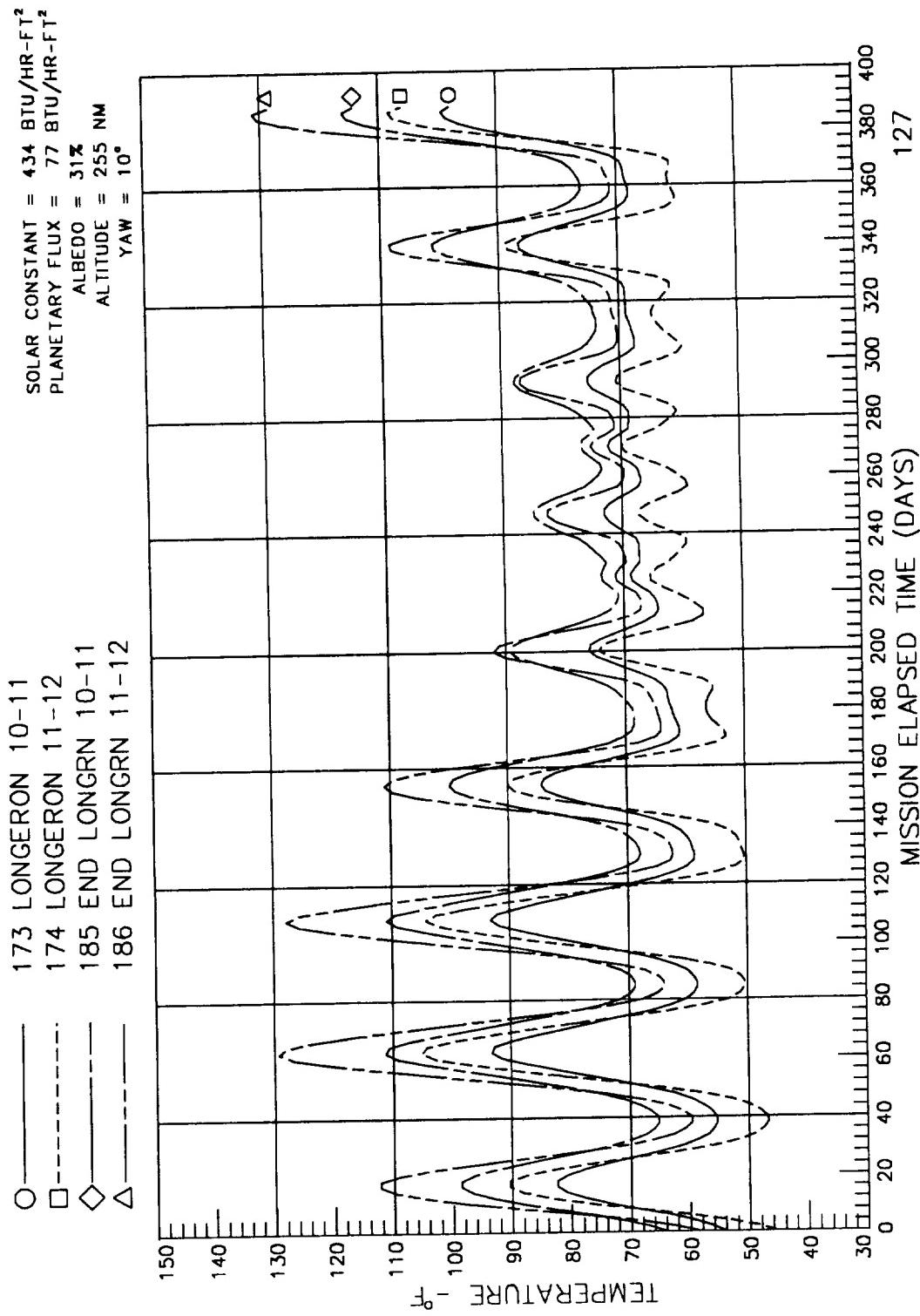
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC D10 & E10



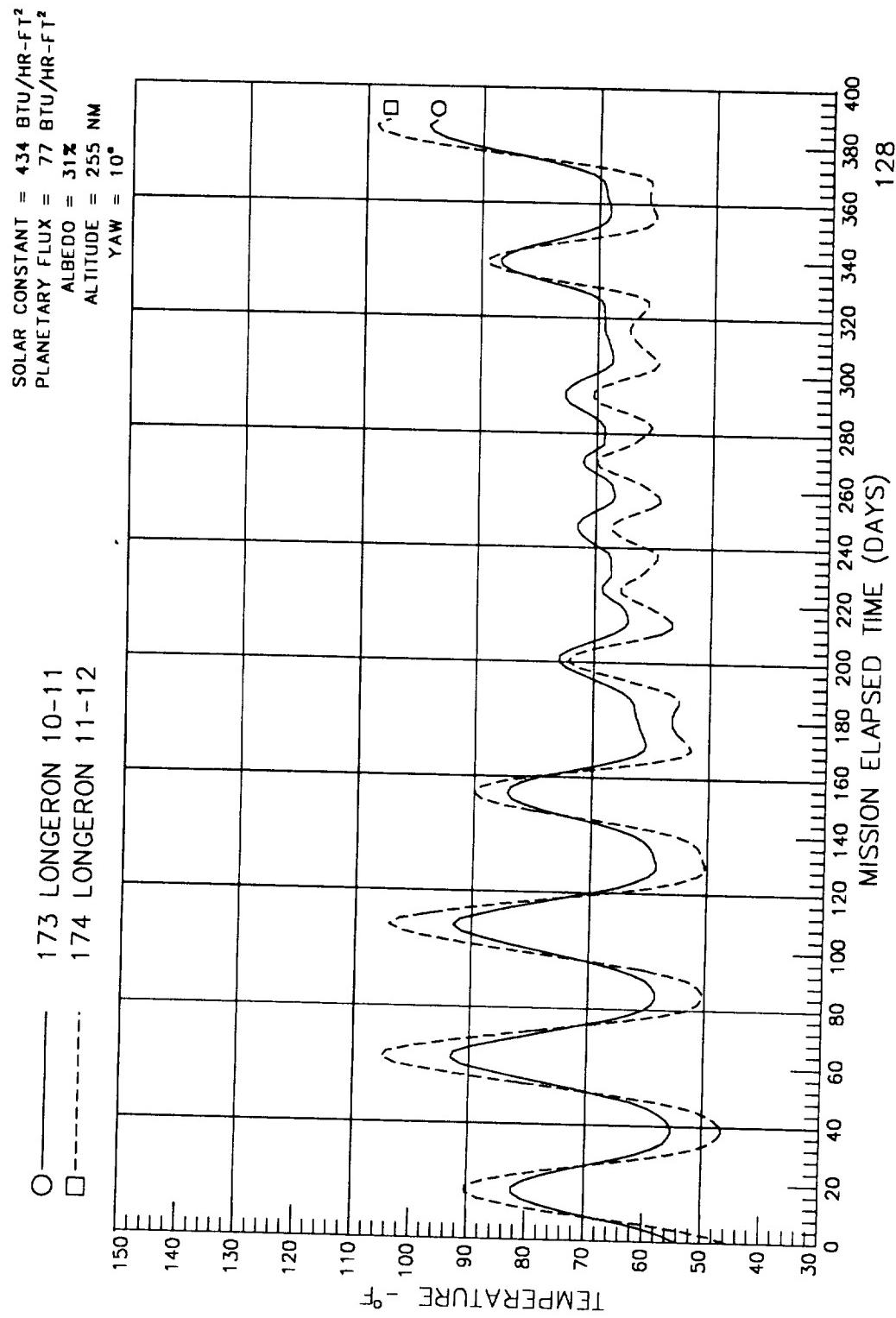
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC F10



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC A11

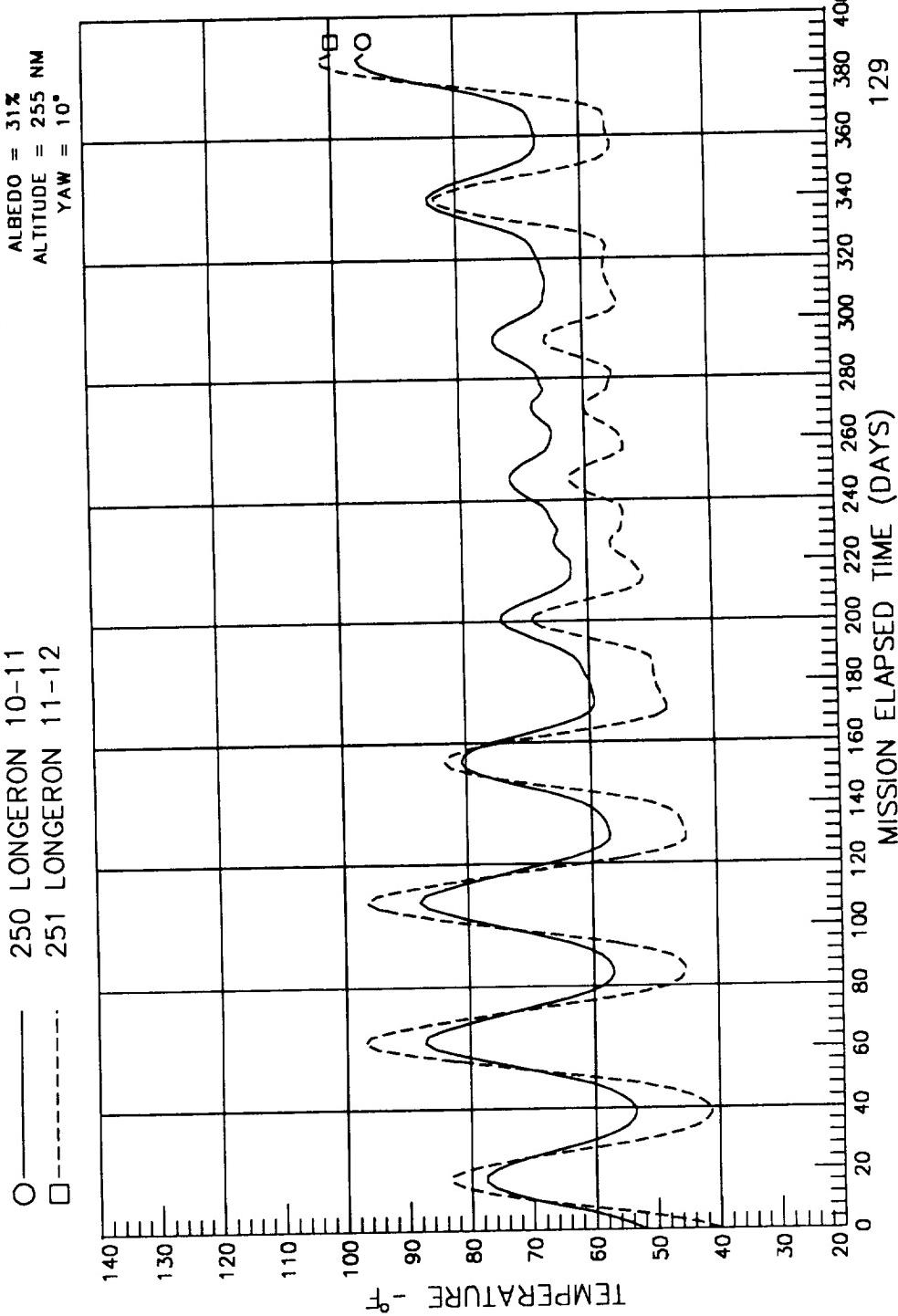


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B11 & C11

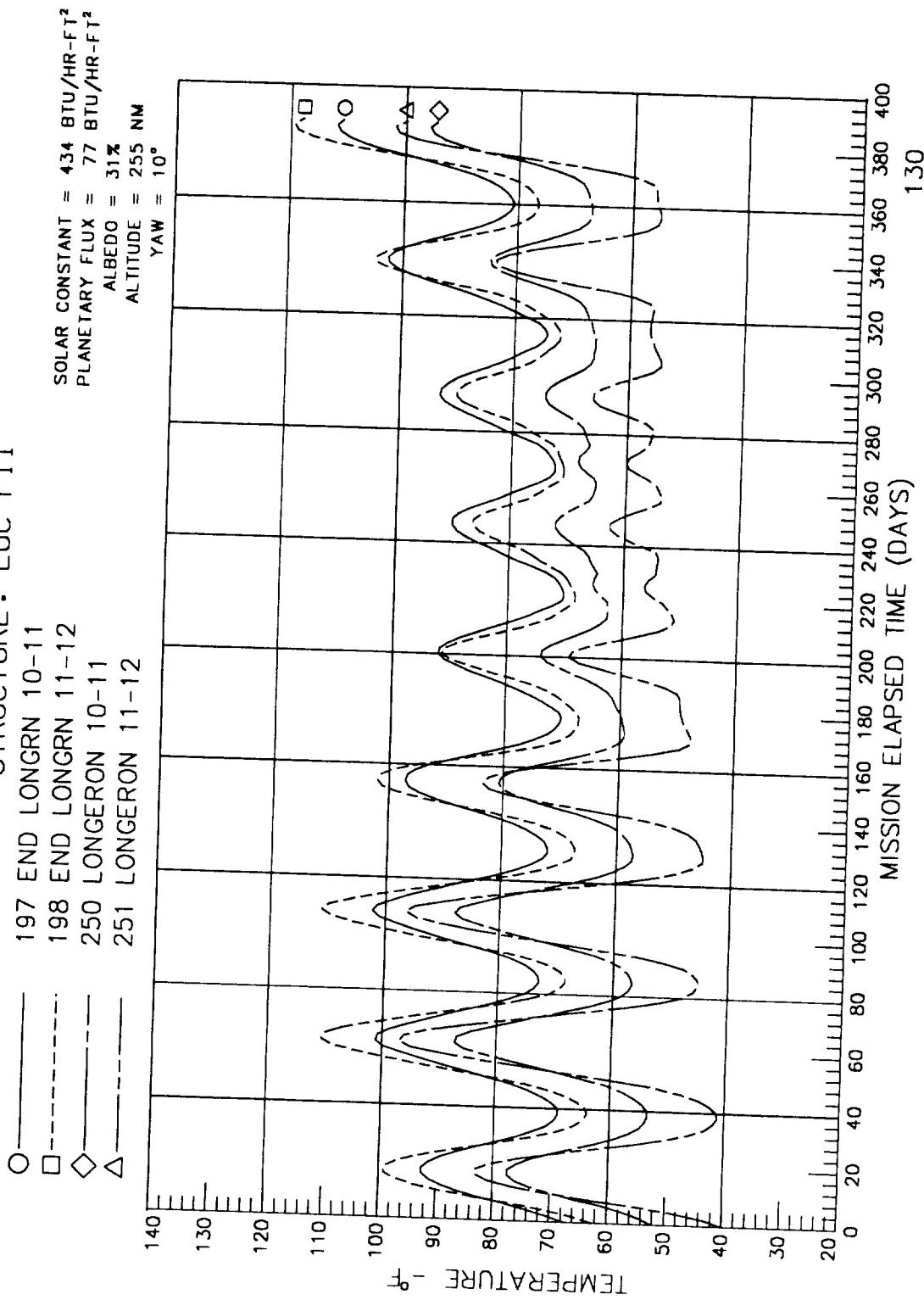


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC D11 & E11

SOLAR CONSTANT = 434 BTU/HR-F²
 PLANETARY FLUX = 77 BTU/HR-F²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE : LOC F11

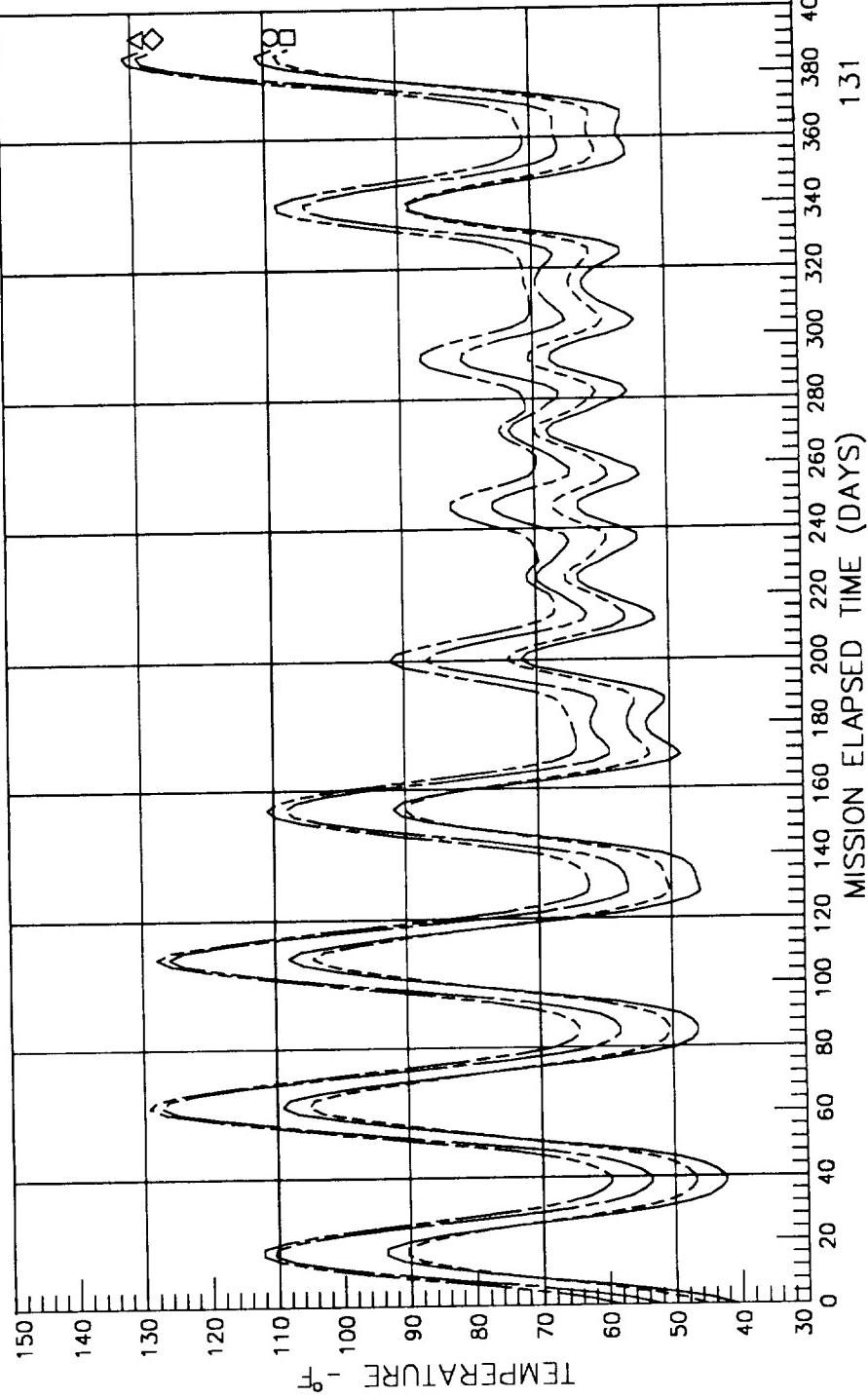


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC A12

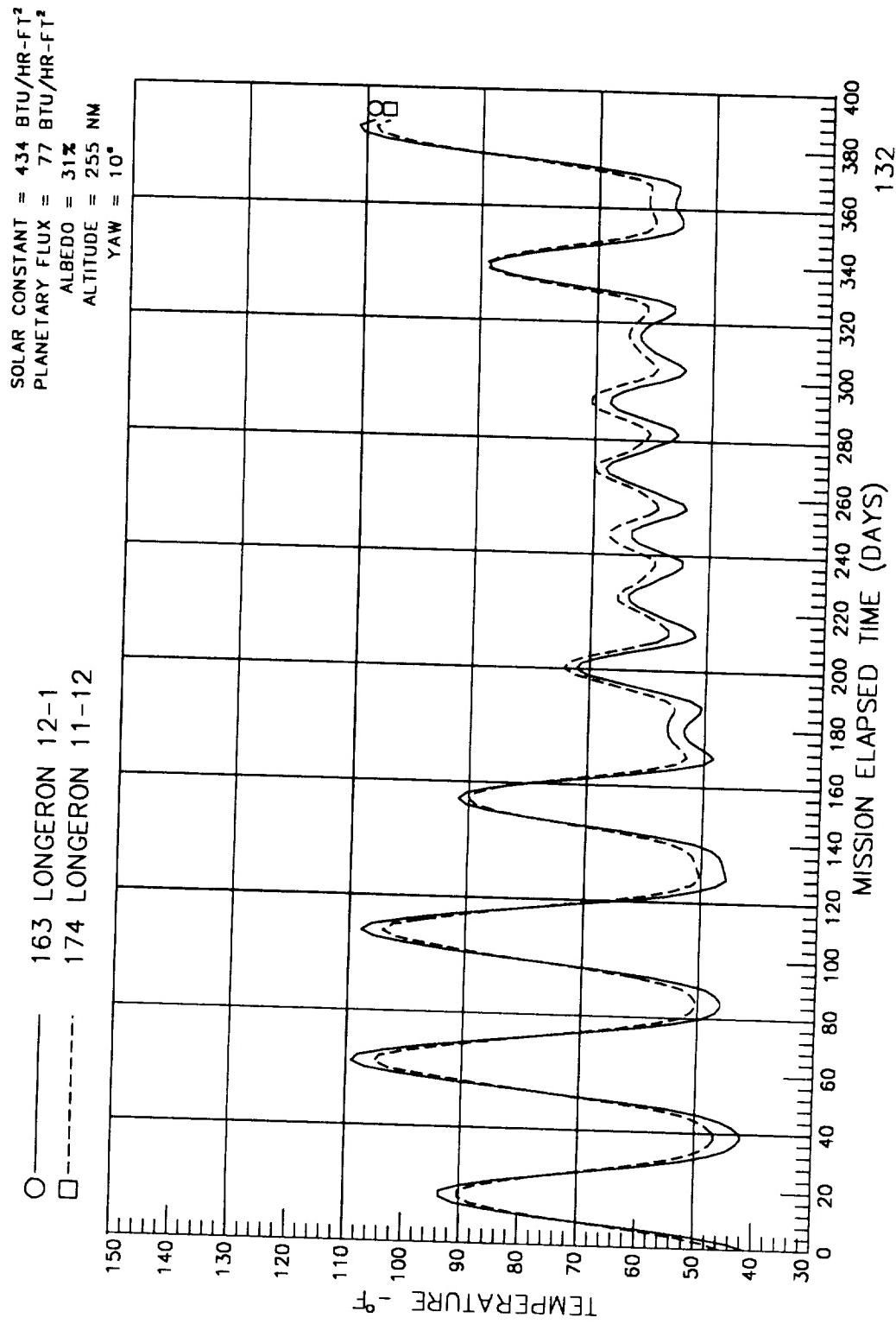
O 163 LONGERON 12-1
 □ 174 LONGERON 11-12
 ◇ 175 END LONGRN 12-1
 △ 186 END LONGRN 11-12

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC B12 & C12



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC D12 & E12

SOLAR CONSTANT = 434 BTU/HR-FT²

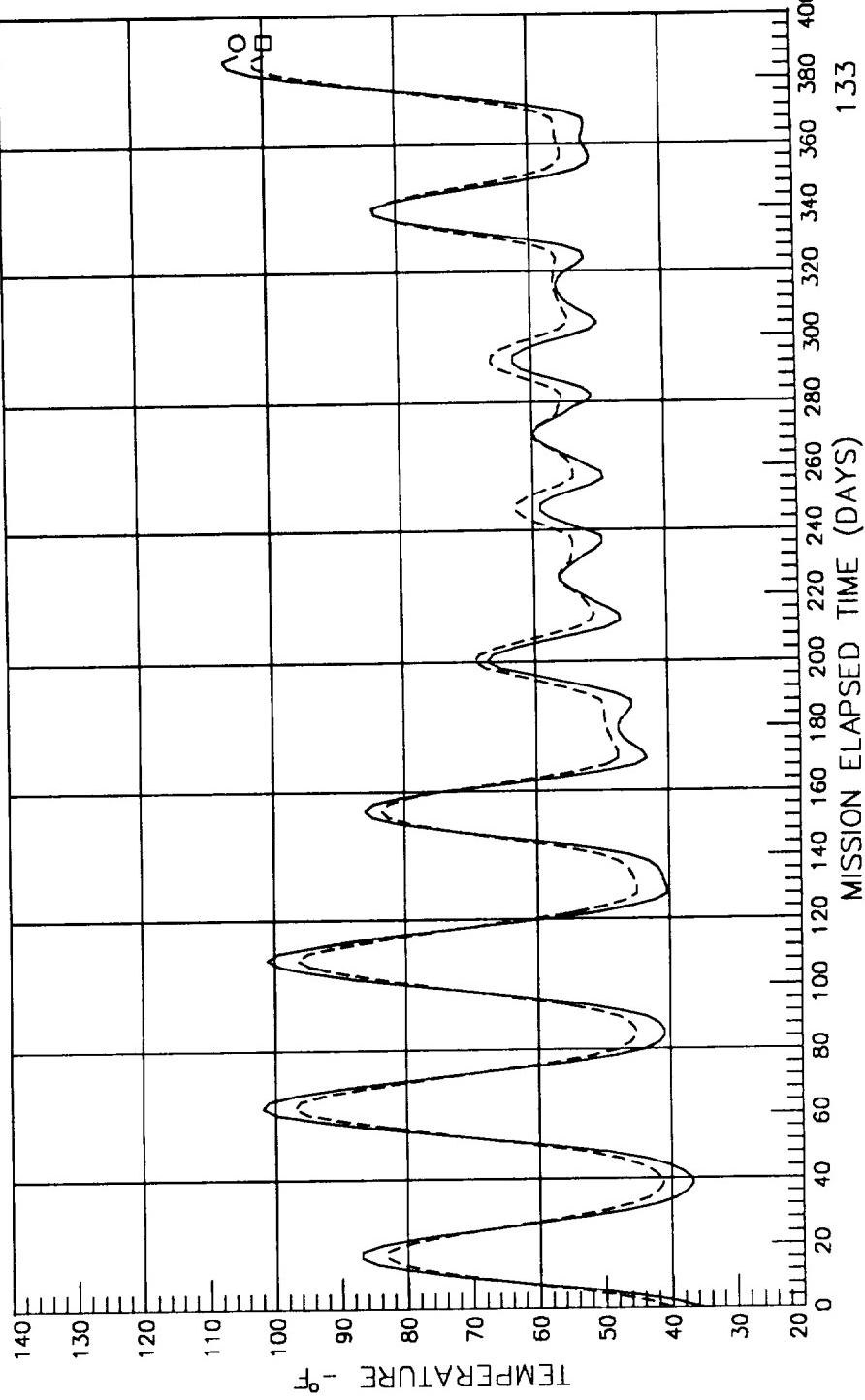
PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%

ALTITUDE = 255 NM

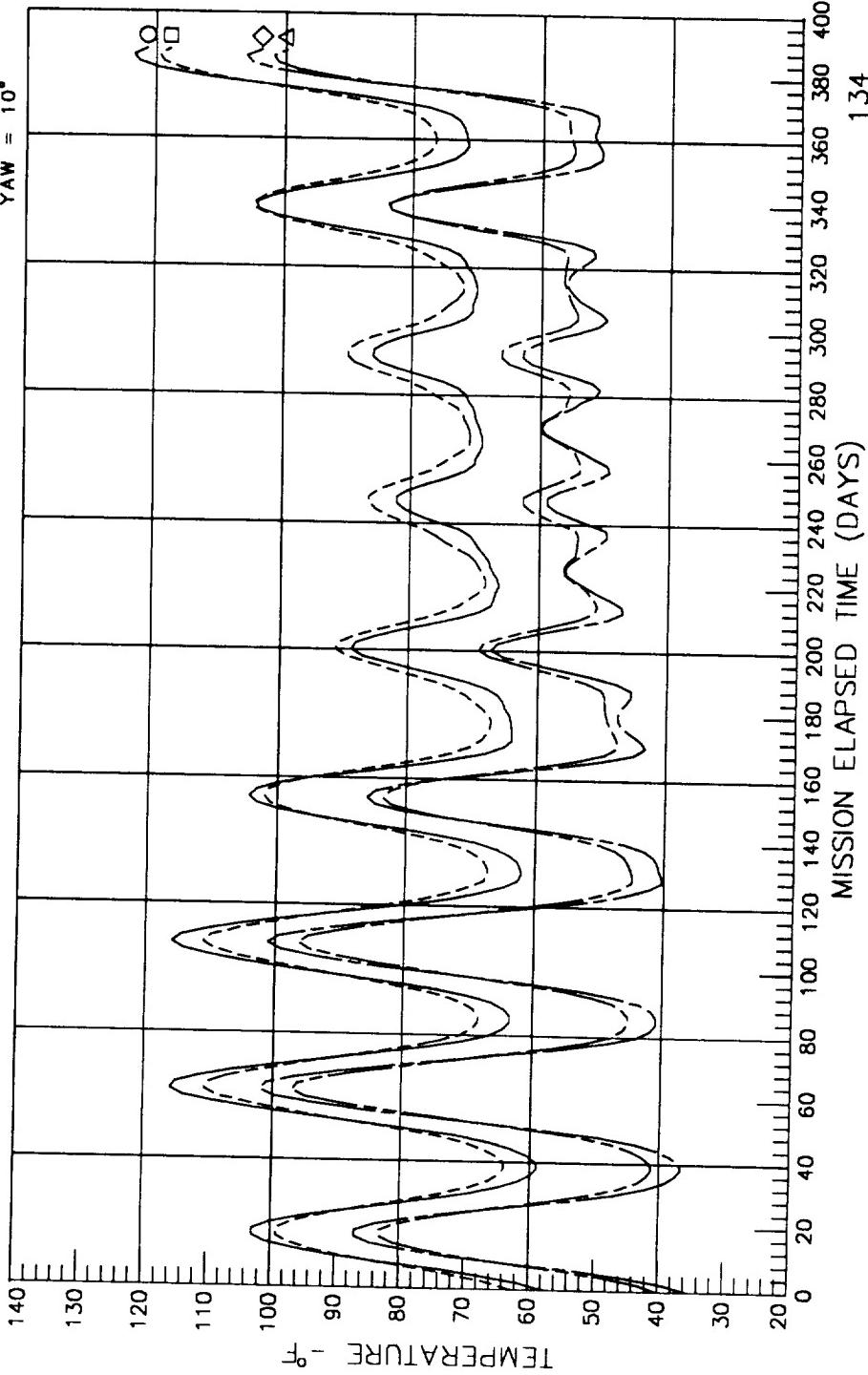
YAW = 10°

— 240 LONGERON 12-1
 - - - 251 LONGERON 11-12



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC F12

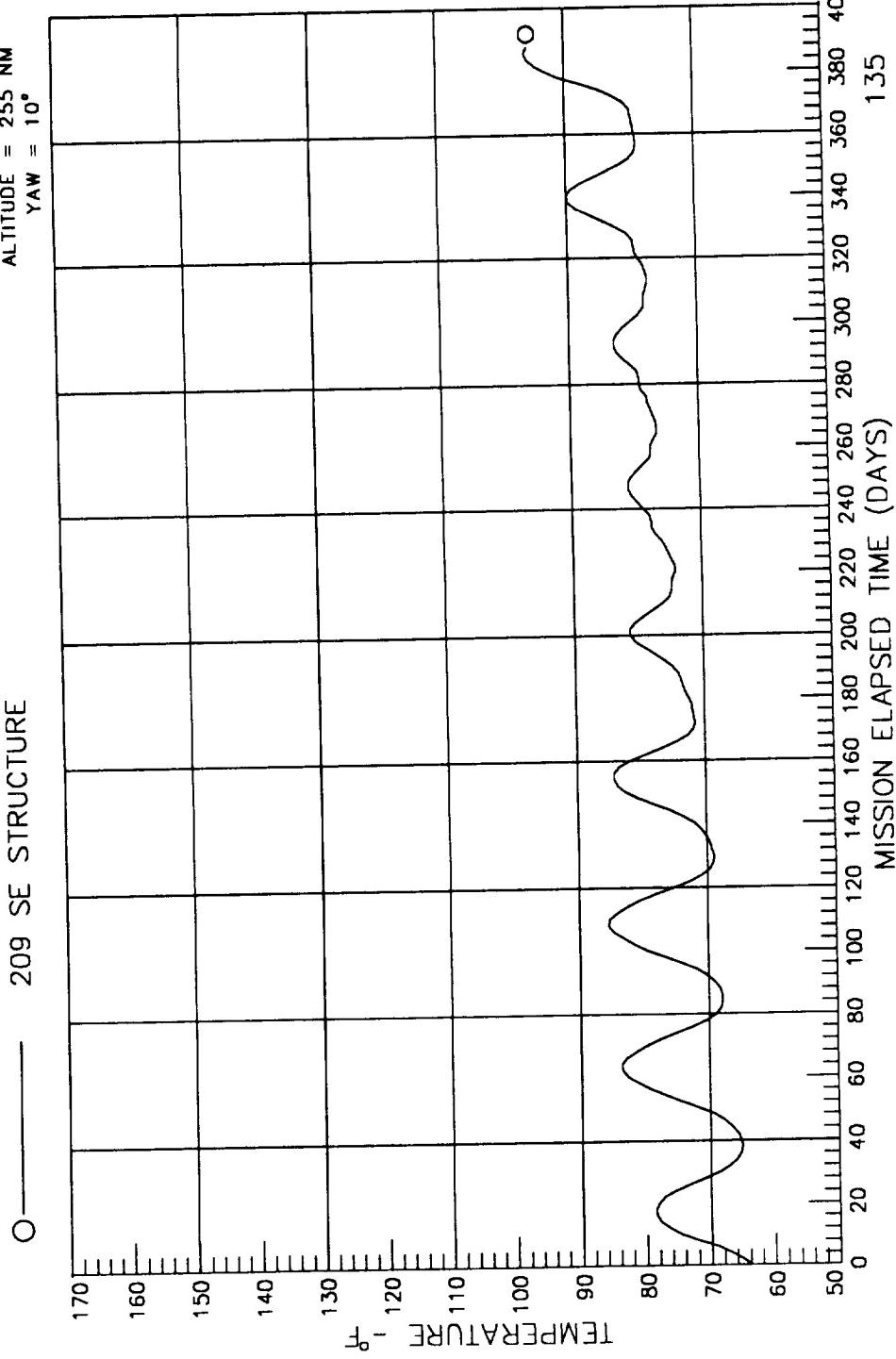
○ -----	187 END LONGRN 12-1
□ -----	198 END LONGRN 11-12
◇ -----	240 LONGERON 12-1
△ -----	251 LONGERON 11-12



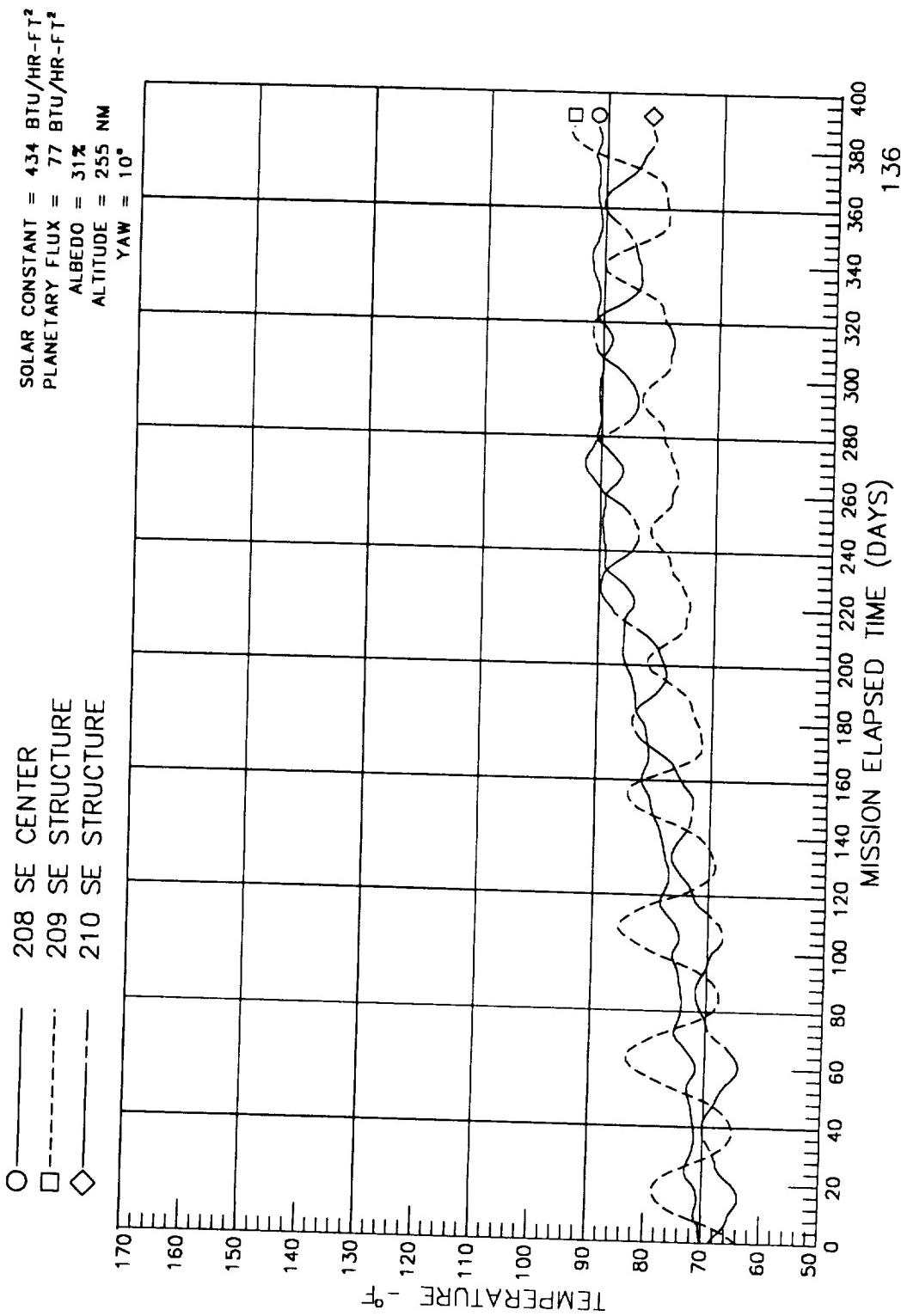
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC H1

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC H3



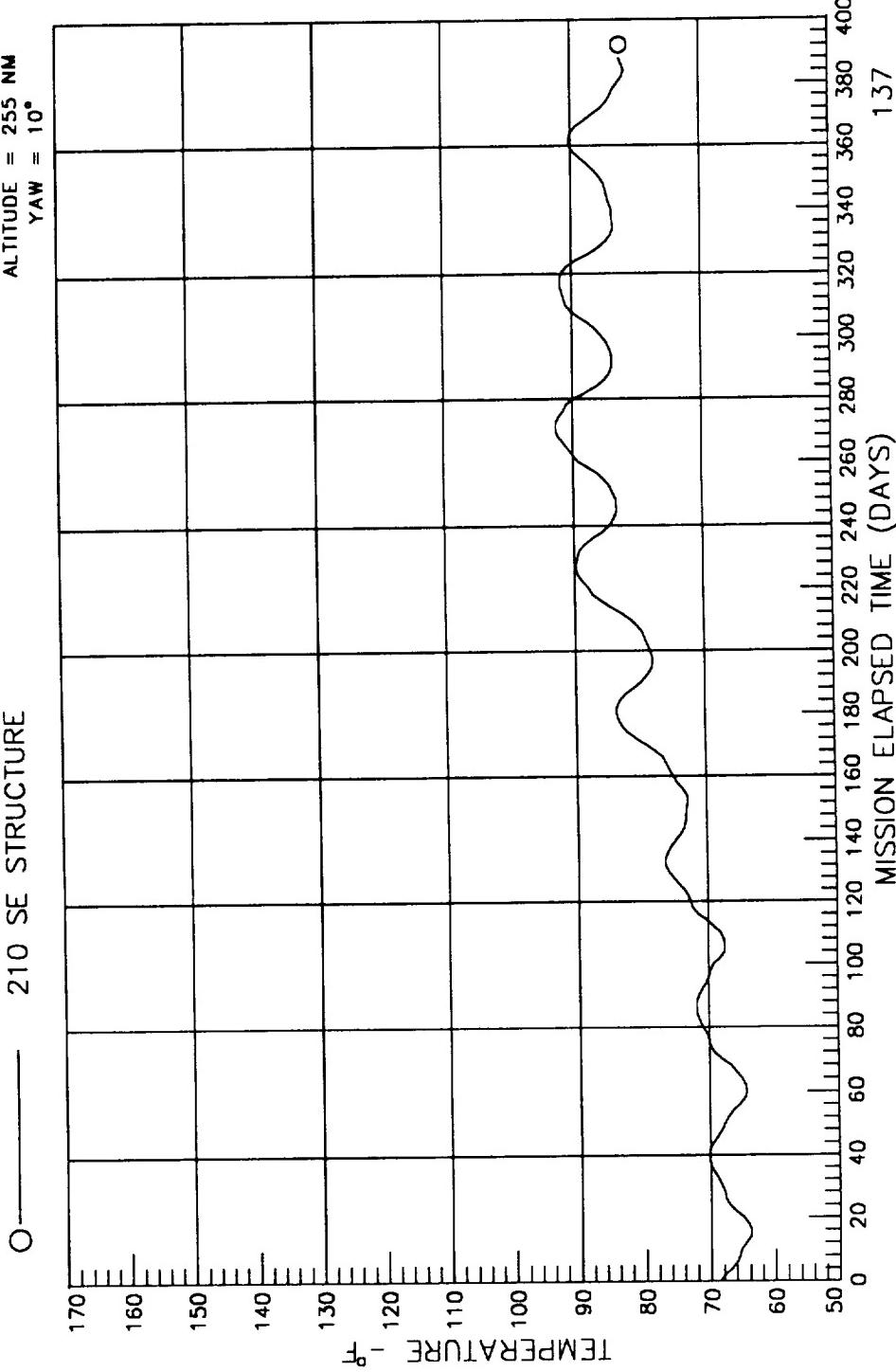
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE : LOC H5

SOLAR CONSTANT = 434 BTU/HR-F²
PLANETARY FLUX = 77 BTU/HR-F²

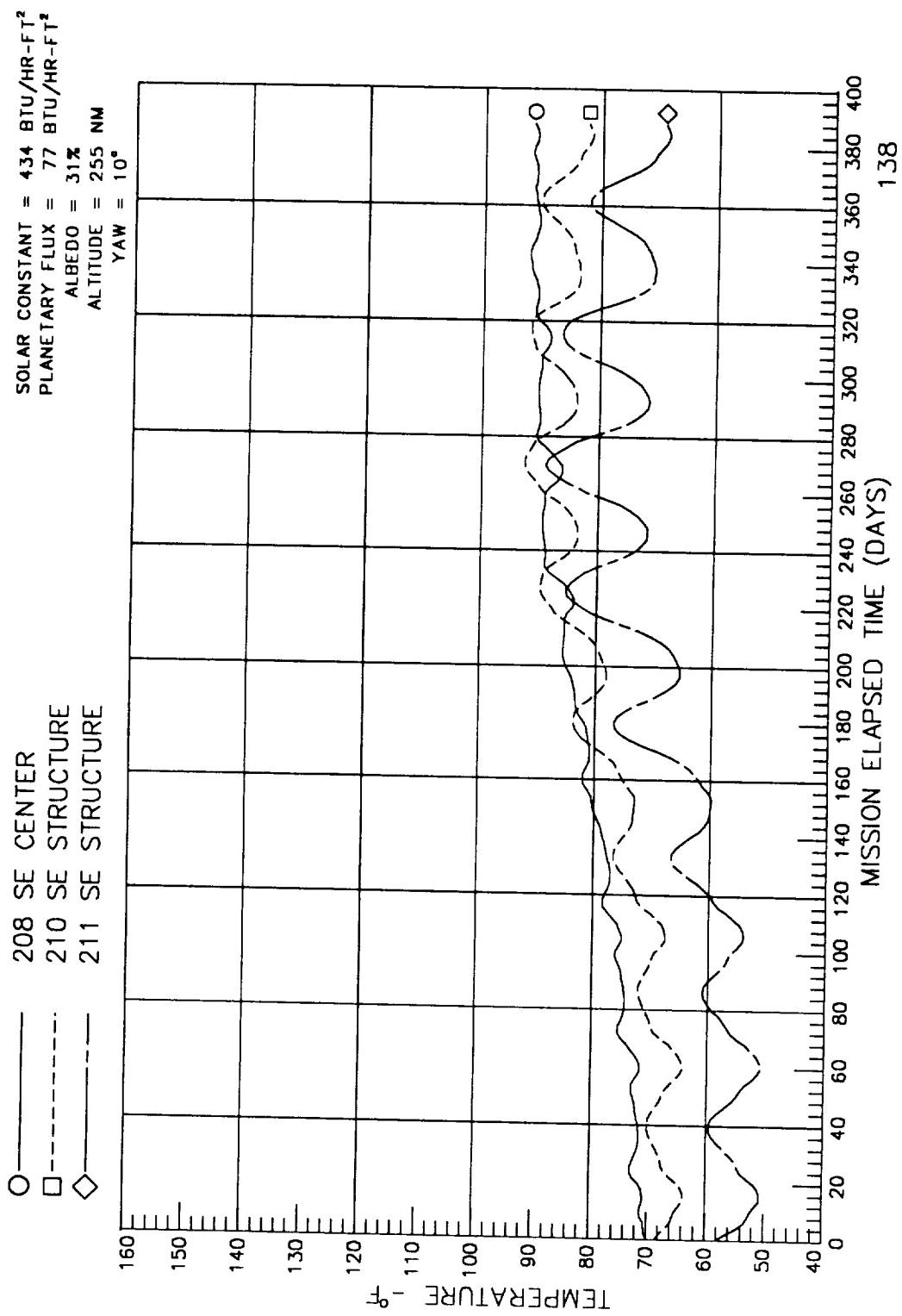
ALBEDO = 31%

ALTITUDE = 255 NM

YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC H6

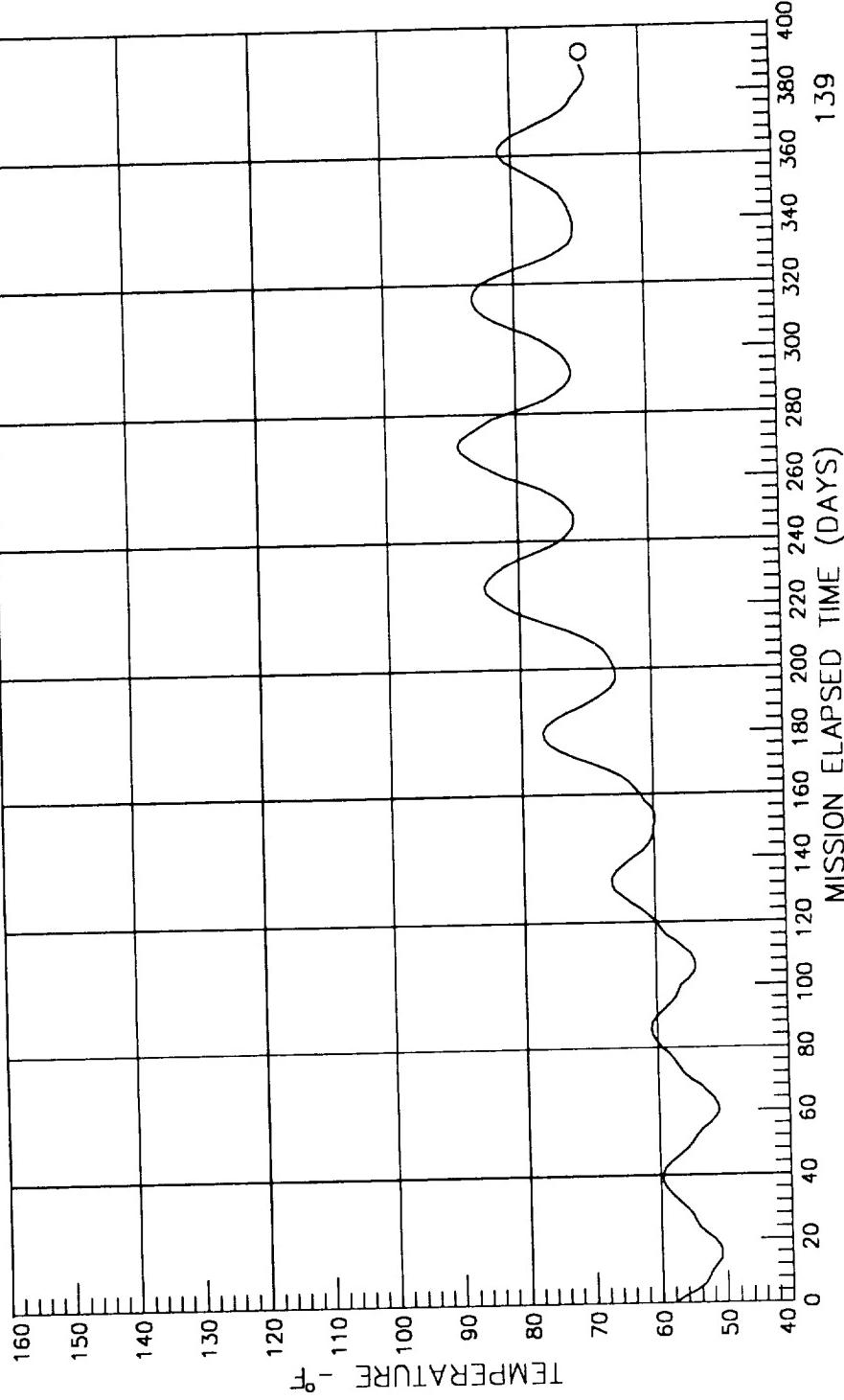


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC H7

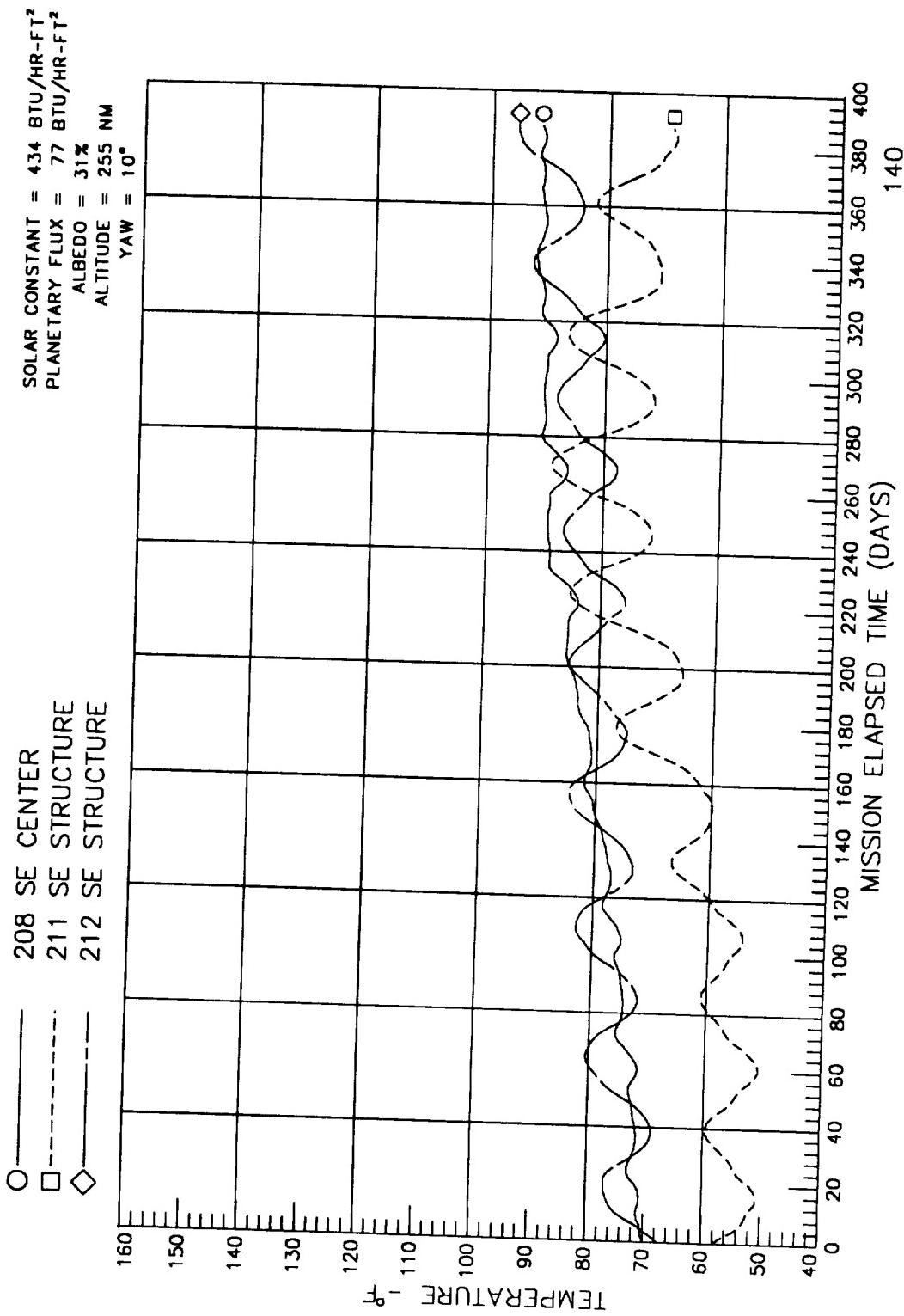
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

O ————— 211 SE STRUCTURE



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC H9

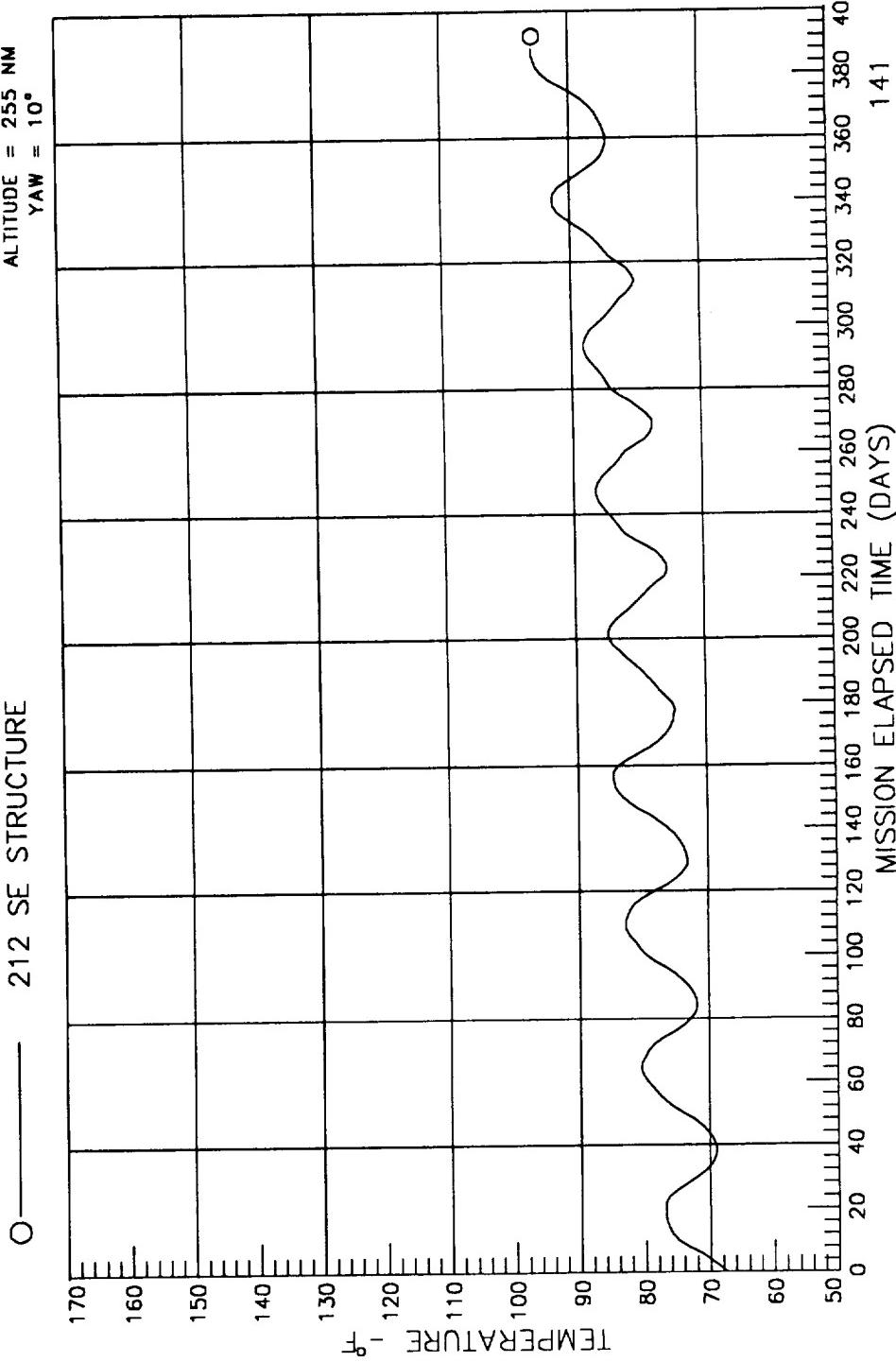


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC H11

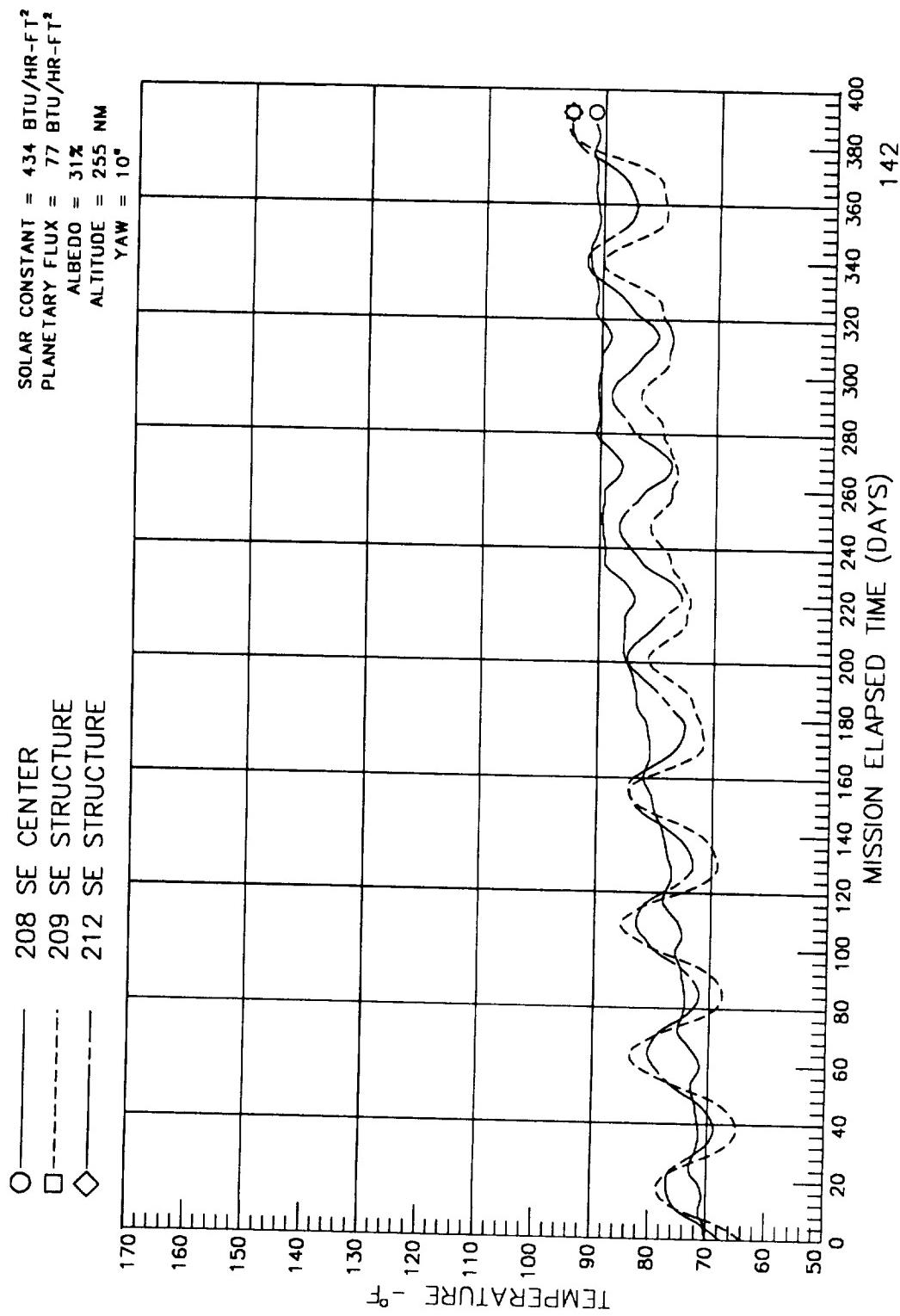
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%

ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC H12



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC G2

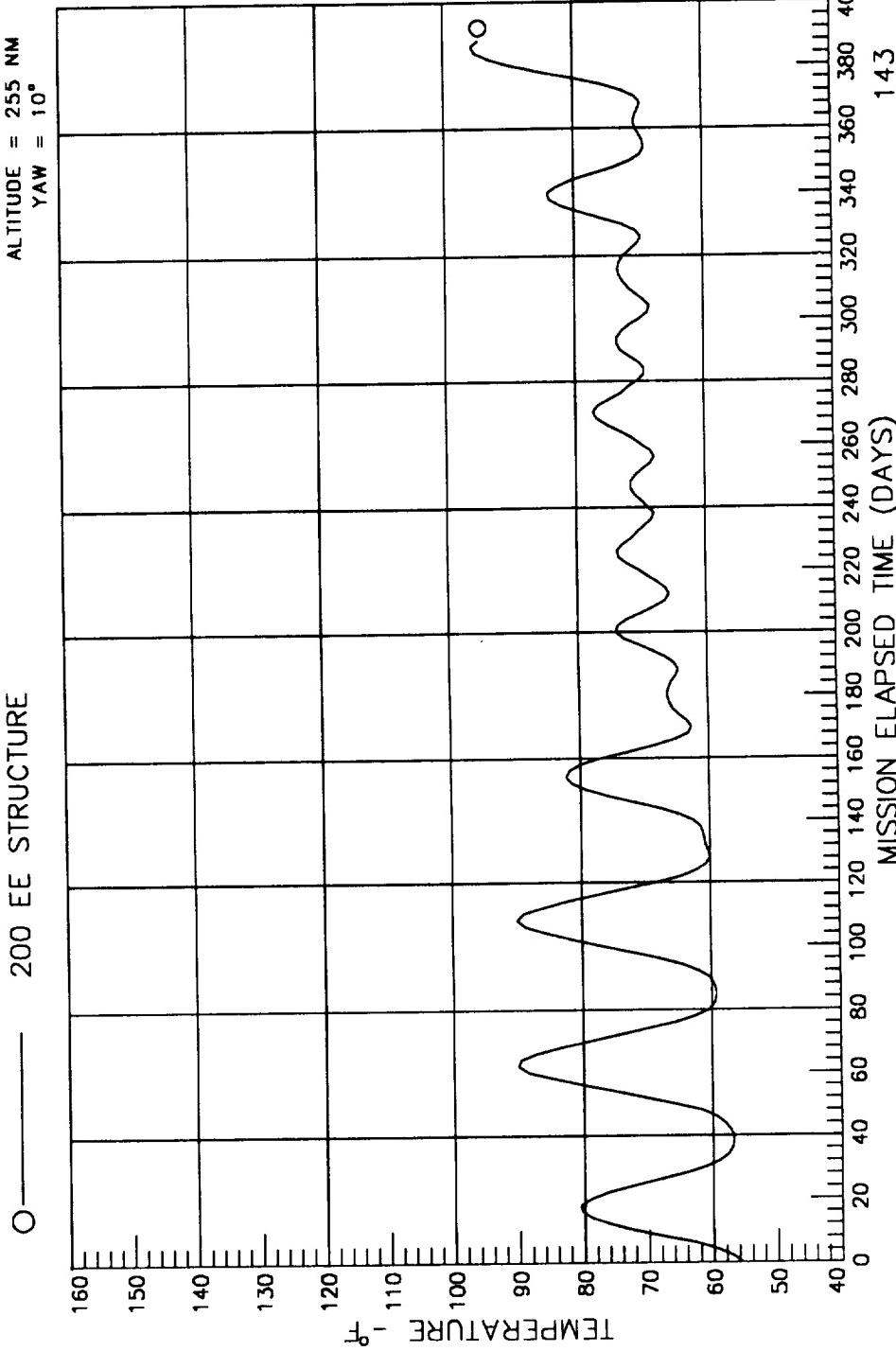
SOLAR CONSTANT = 4.34 BTU/HR-FT²

PLANETARY FLUX = 77 BTU/HR-FT²

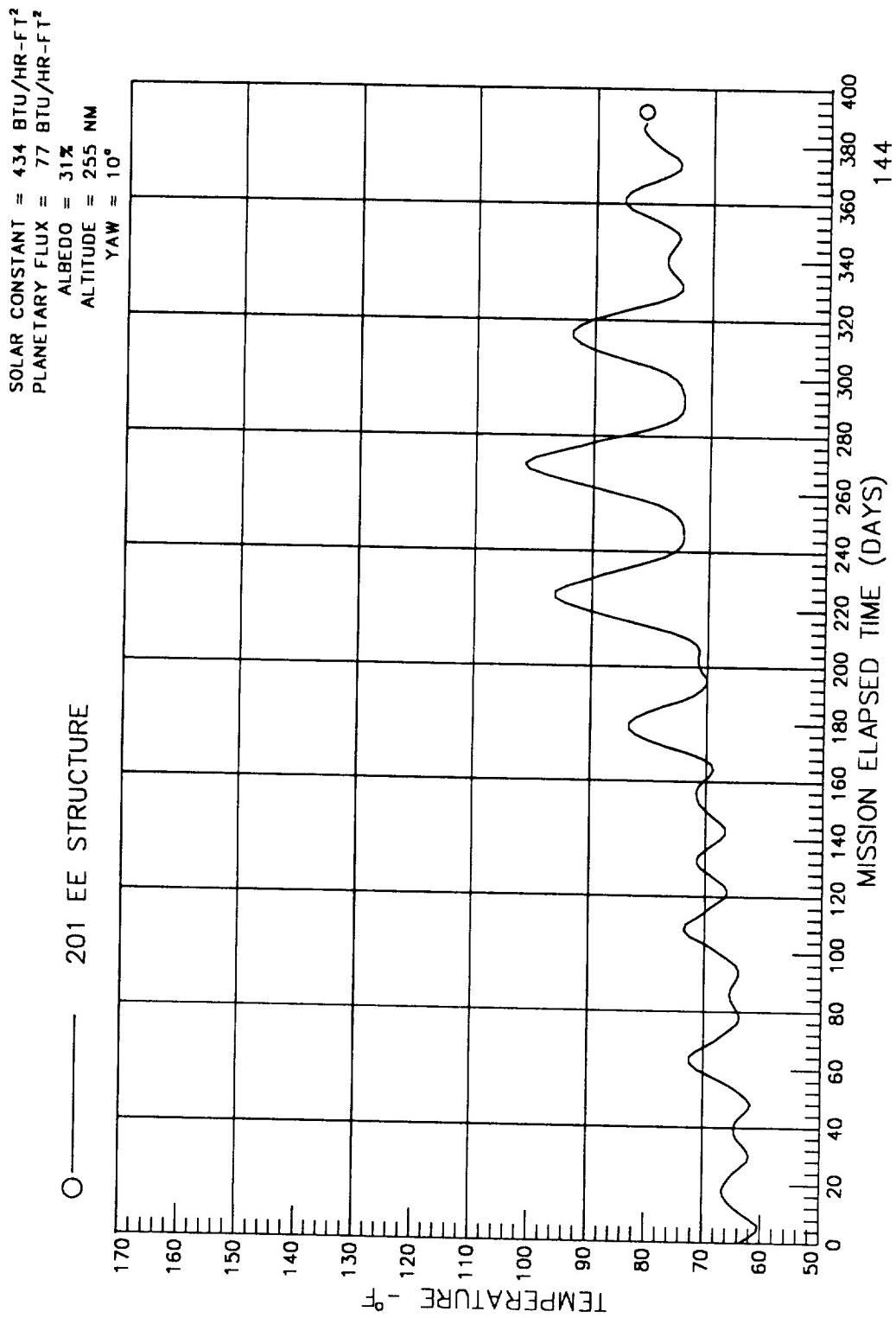
ALBEDO = 31%

ALTITUDE = 255 NM

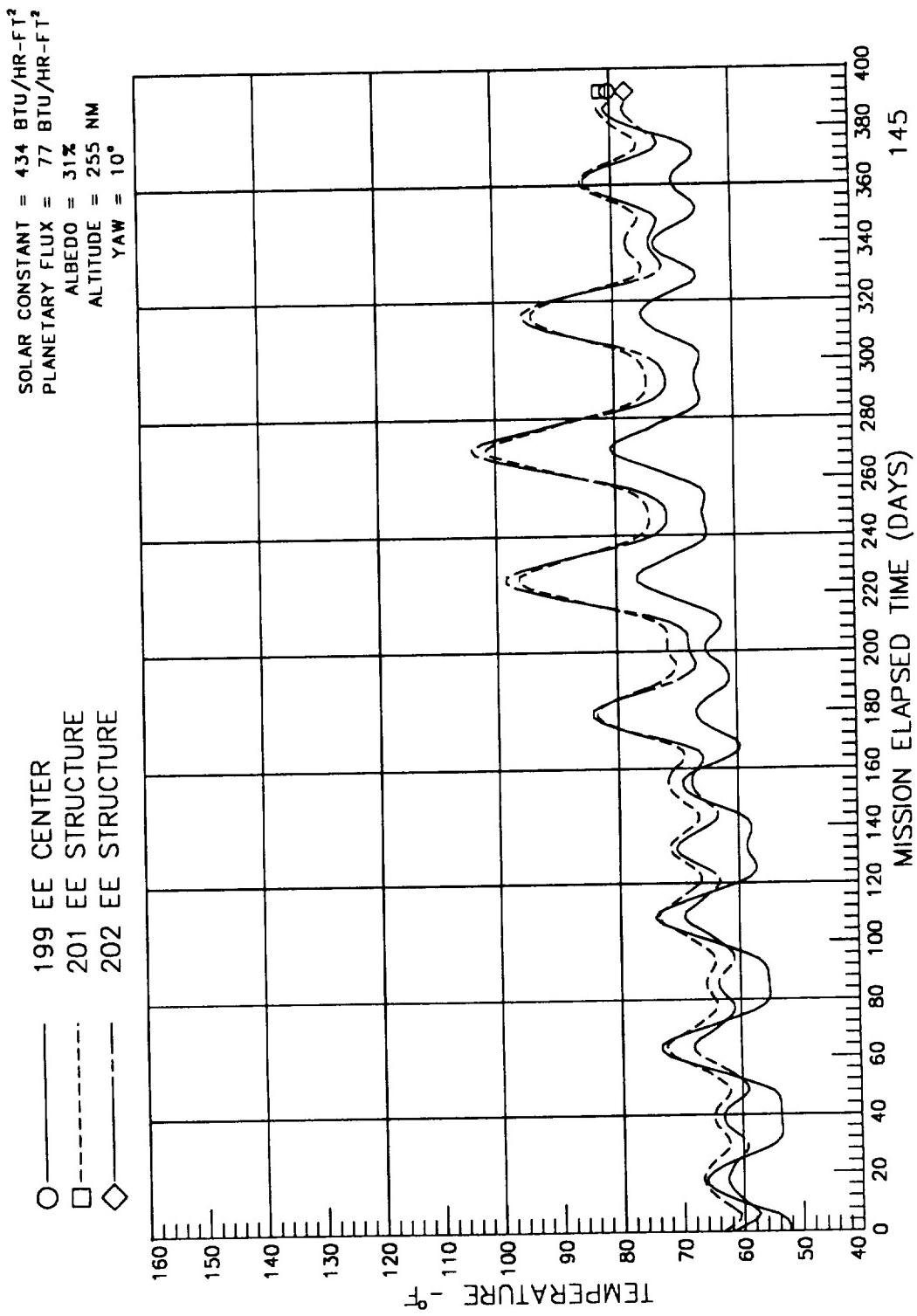
YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC G4

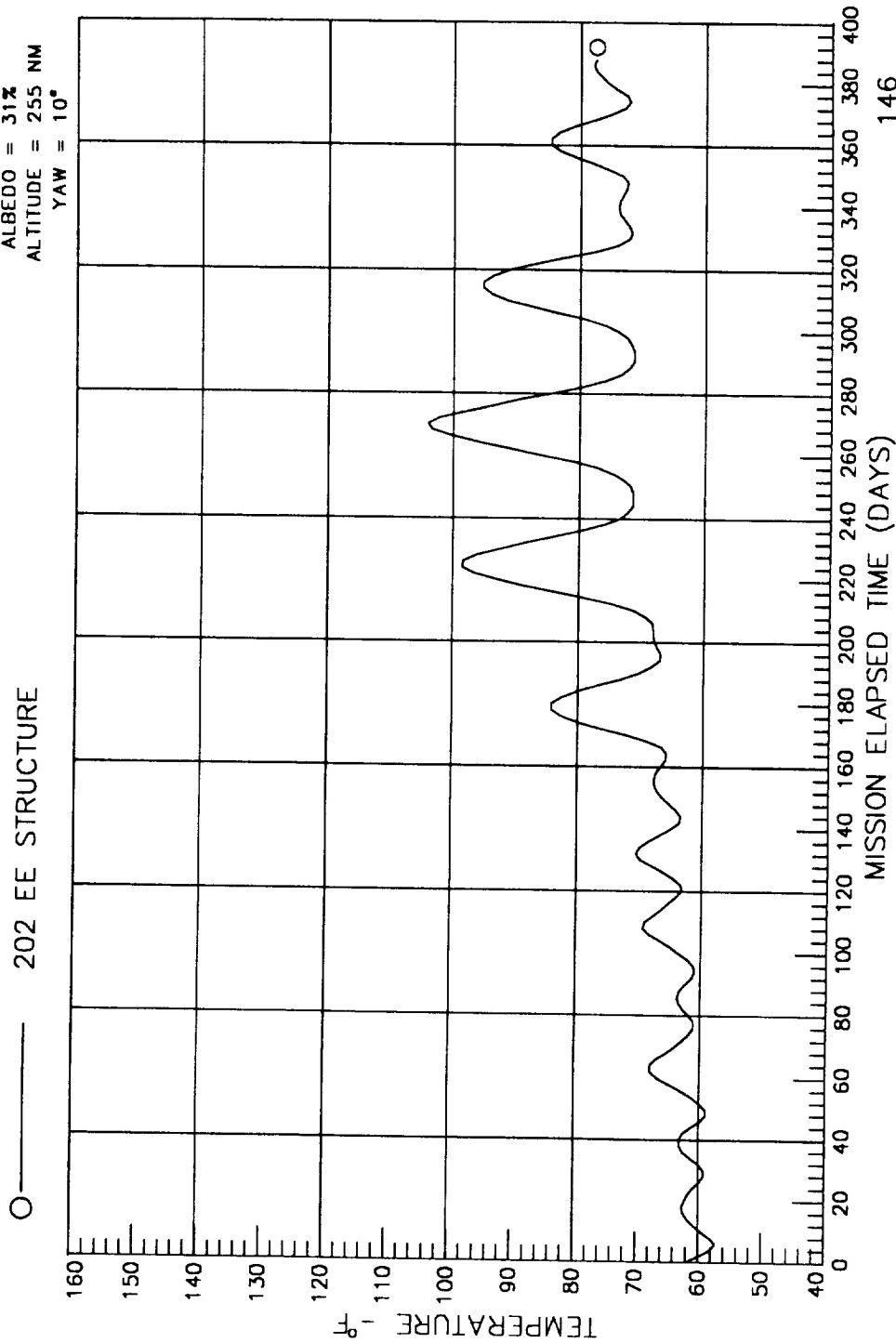


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE : LOC G6



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
STRUCTURE : LOC 68

SOLAR CONSTANT = 434 BTU/HR-FT²
PLANETARY FLUX = 77 BTU/HR-FT²
ALBEDO = 31%
ALTITUDE = 255 NM
YAW = 10°

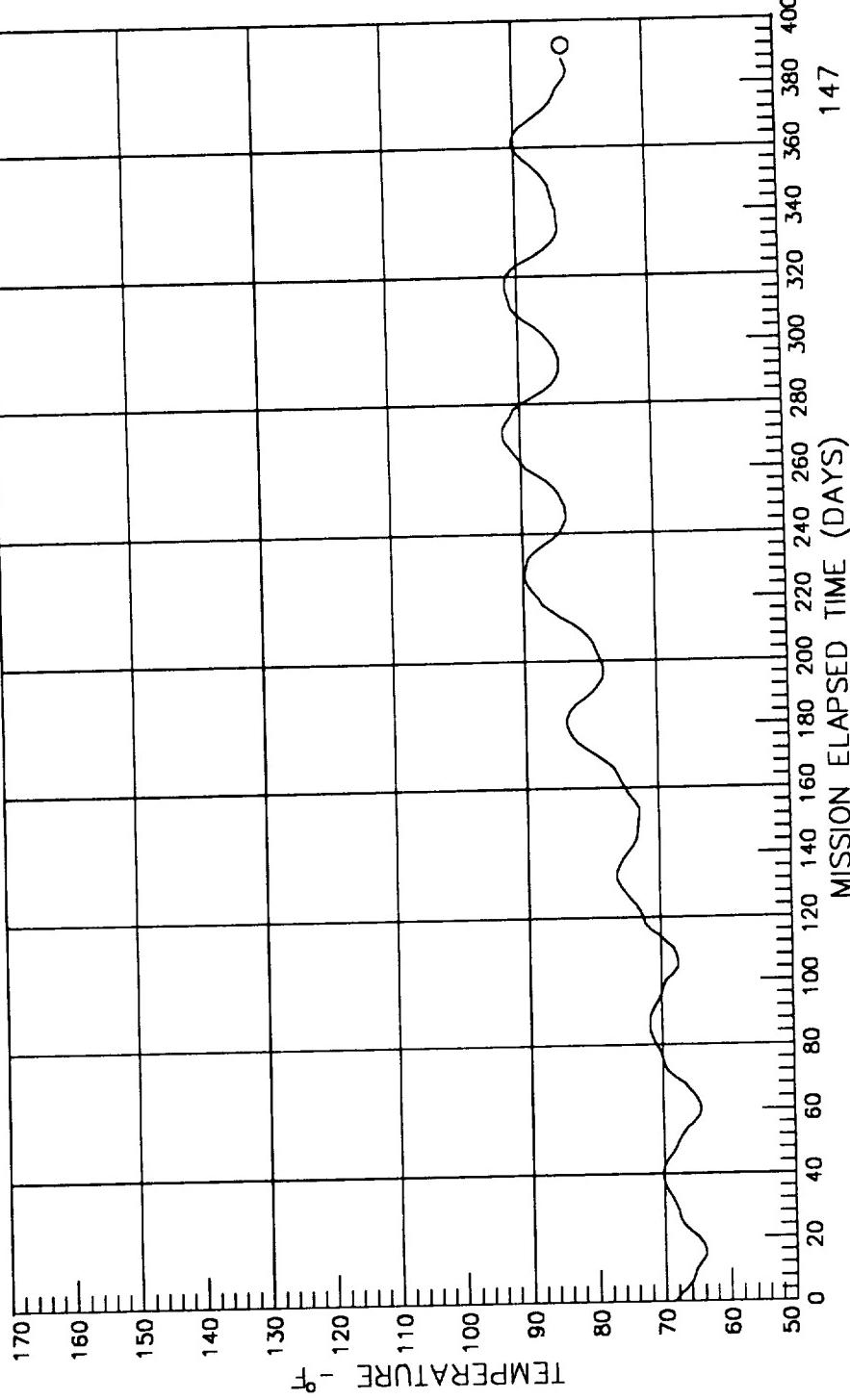


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC G10

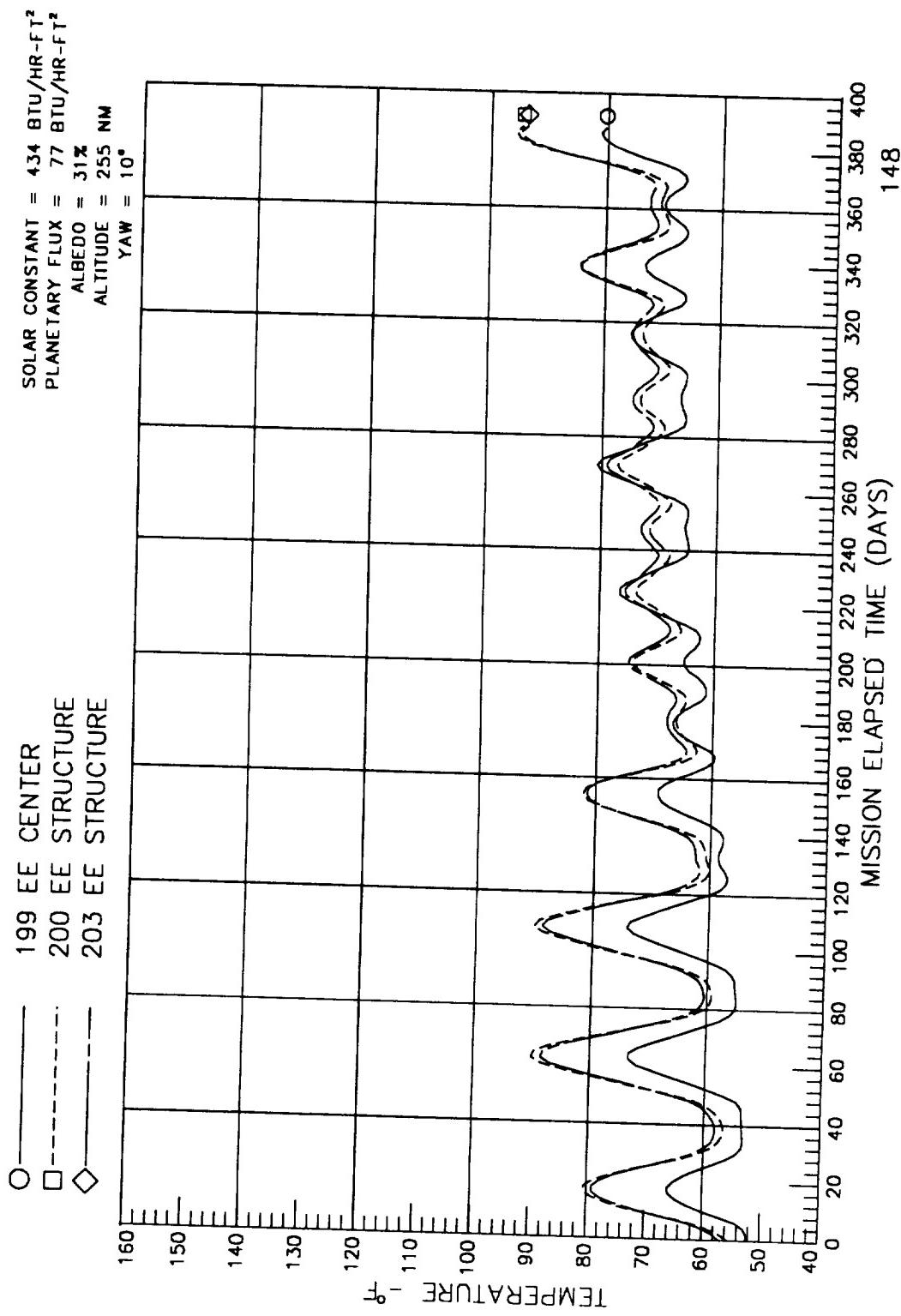
SOLAR CONSTANT = 4.34 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

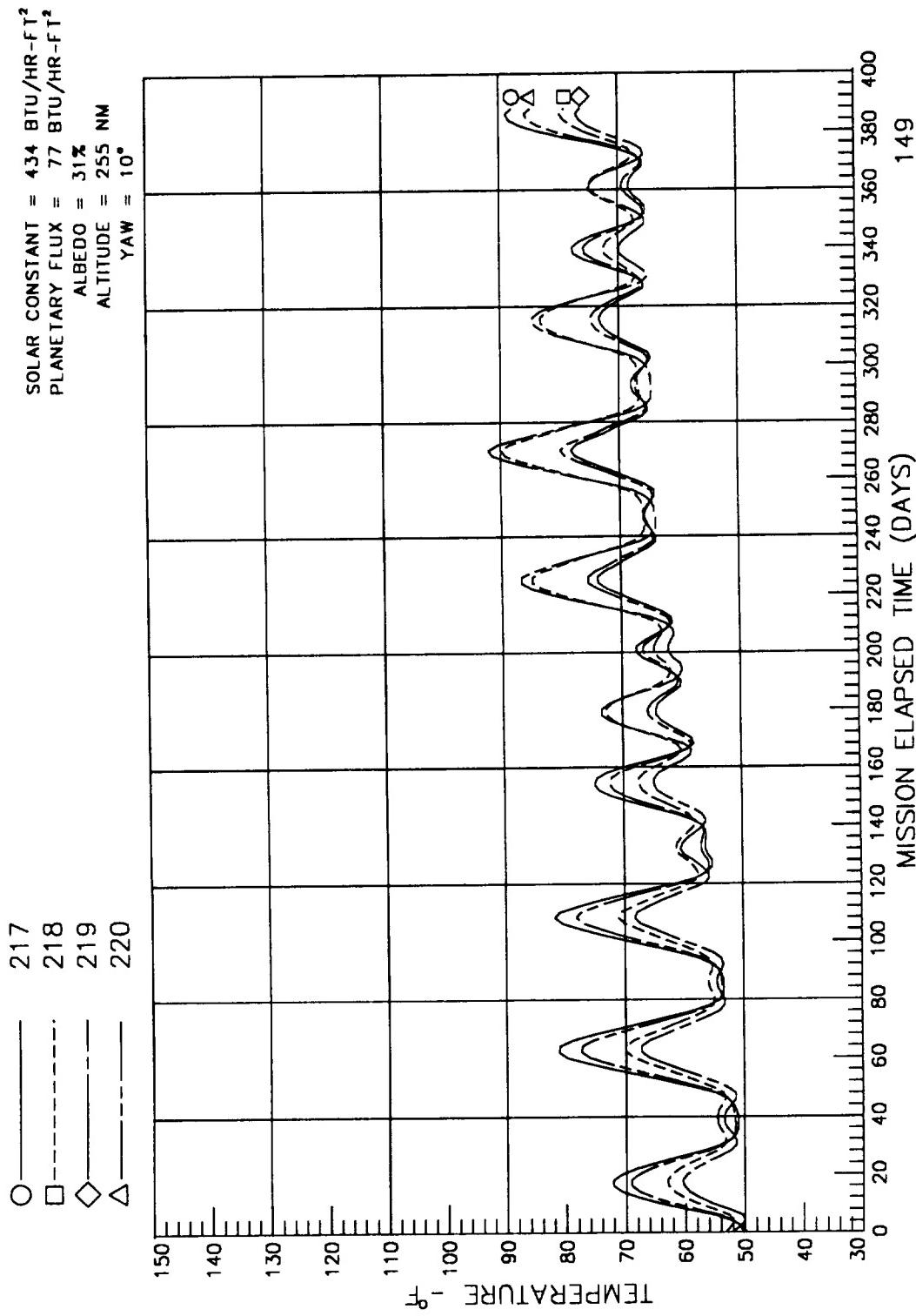
203 EE STRUCTURE



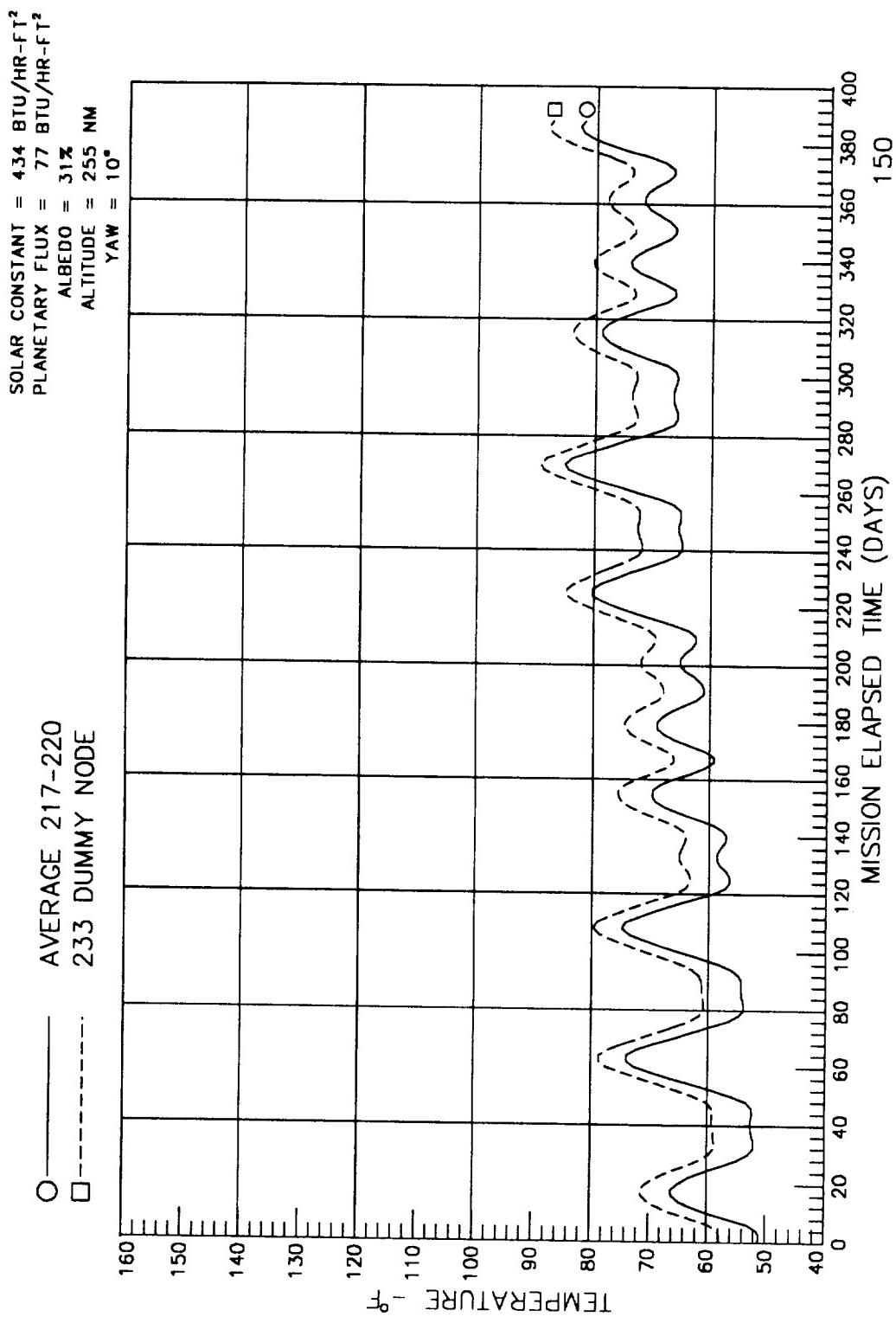
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 STRUCTURE: LOC 612



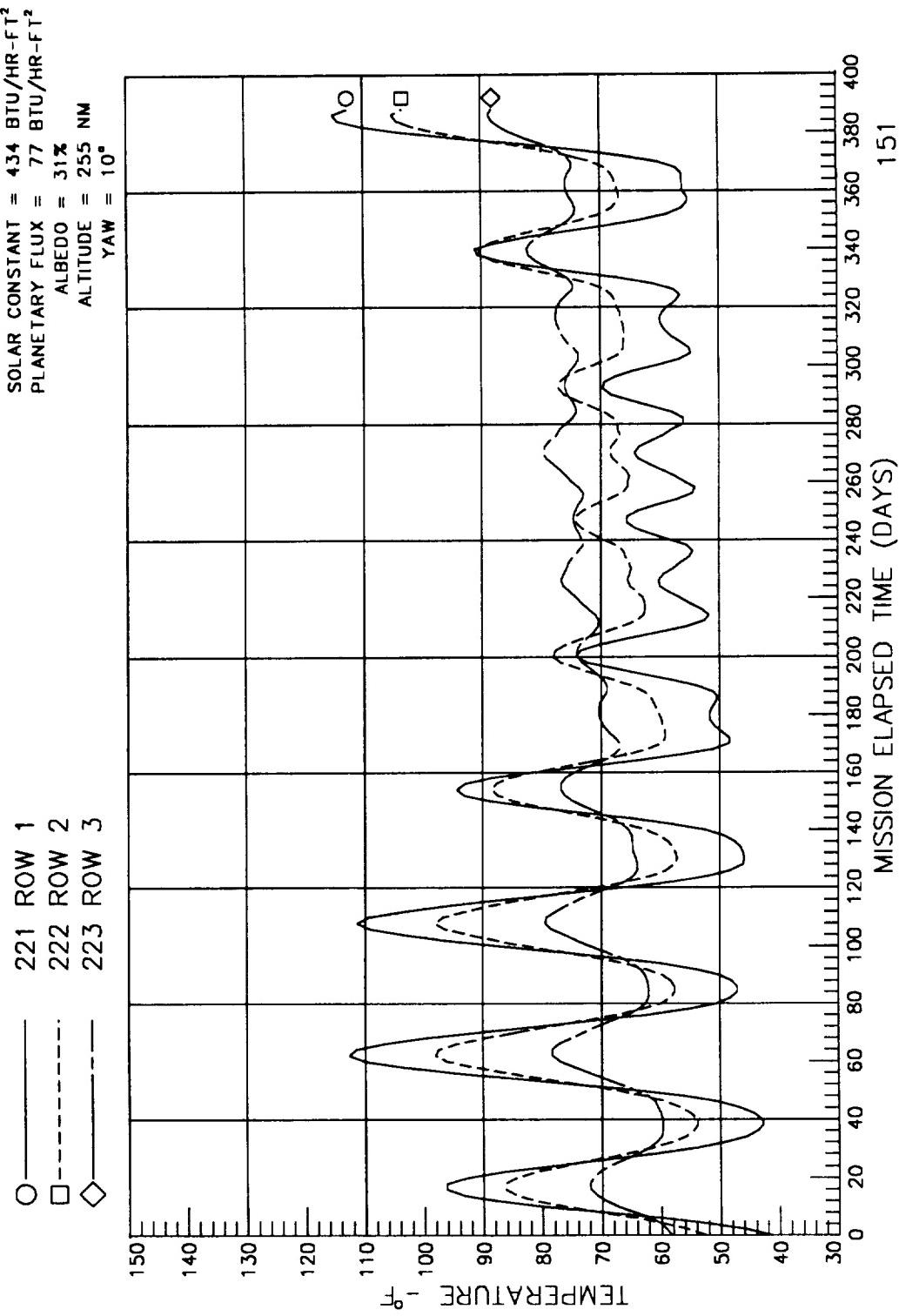
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER STRUCTURE INTERIOR



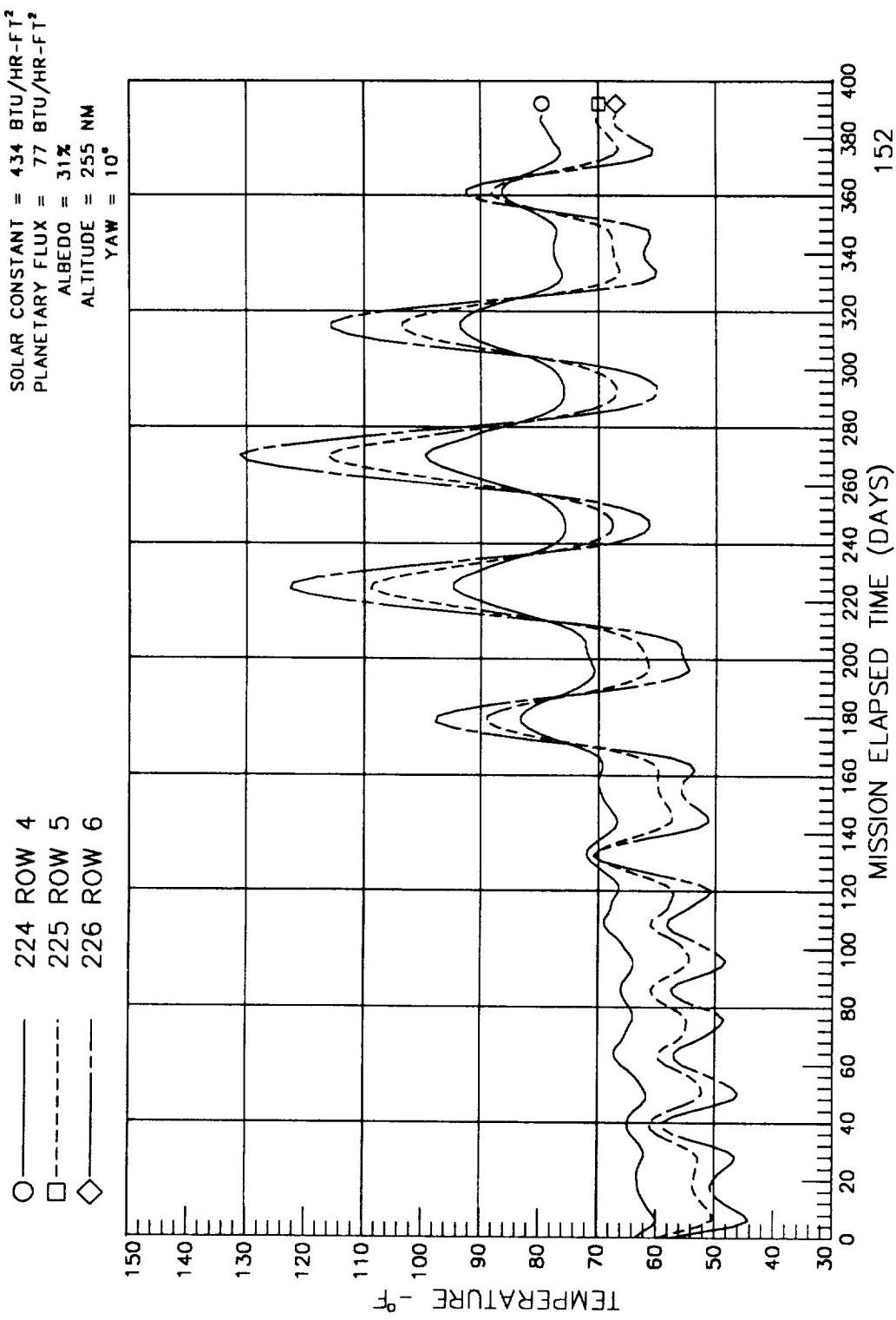
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER STRUCTURE



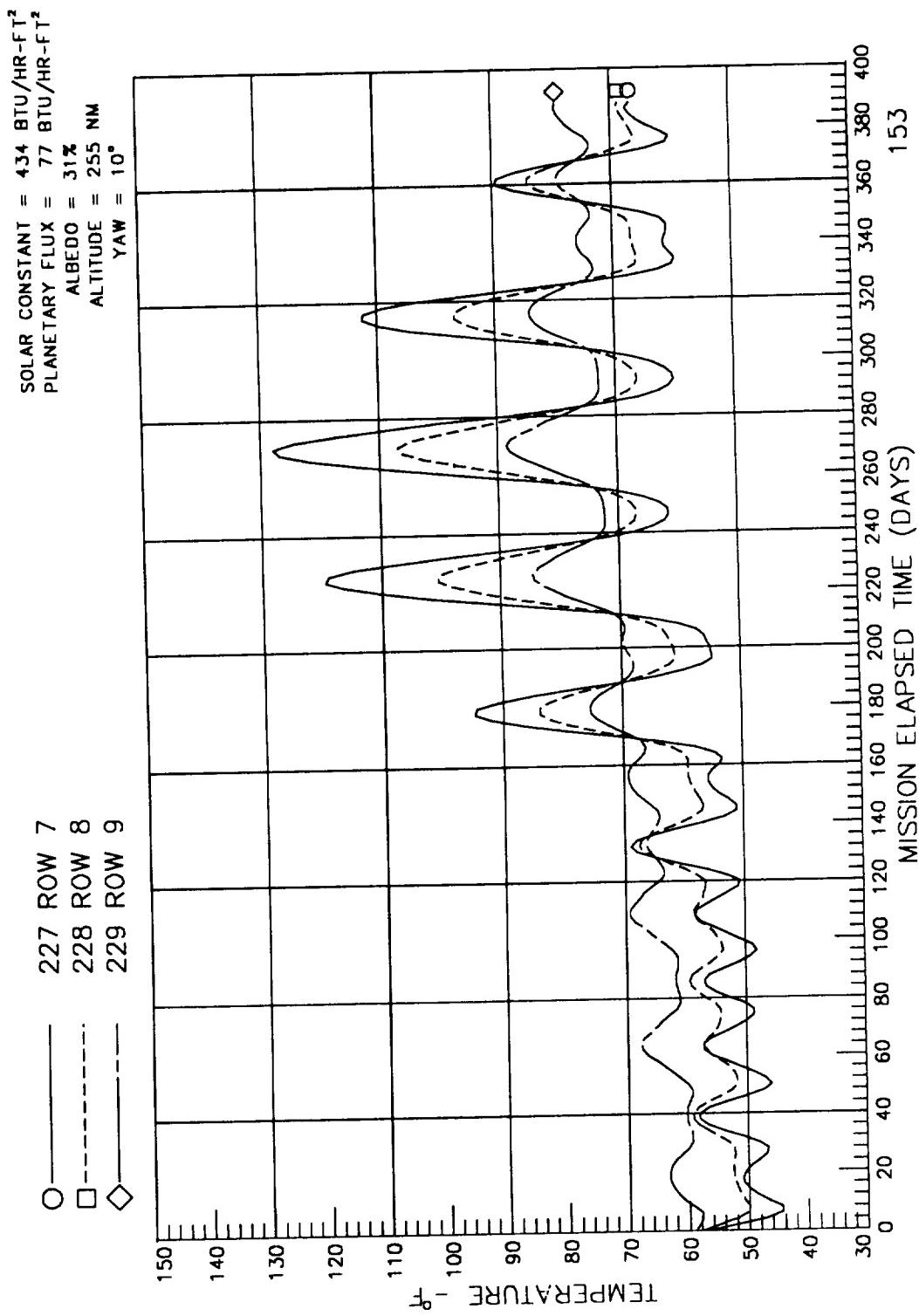
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER RING ROWS 1-3



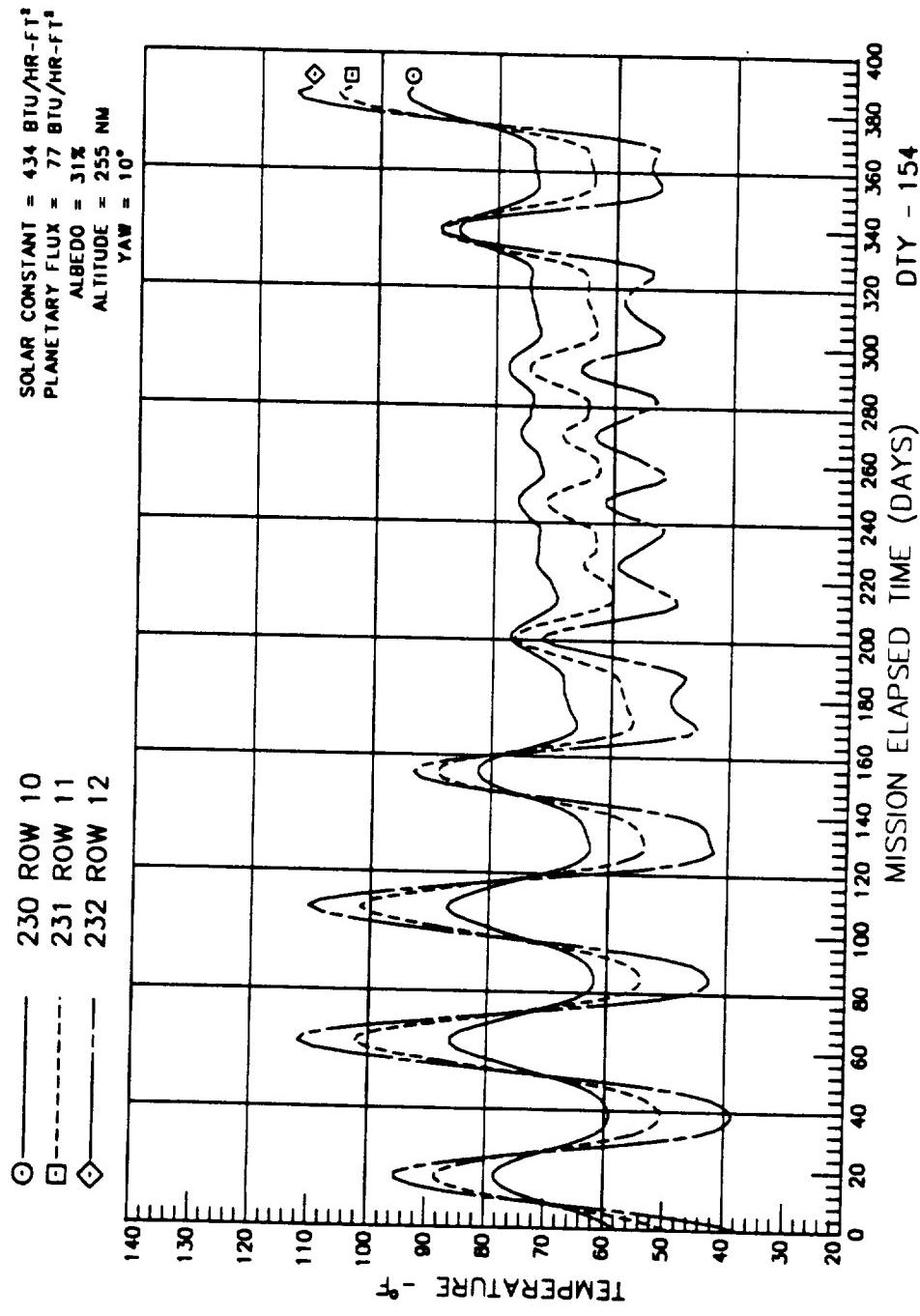
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER RING ROWS 4-6



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER RING ROWS 7-9



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 CENTER RING ROWS 10-12

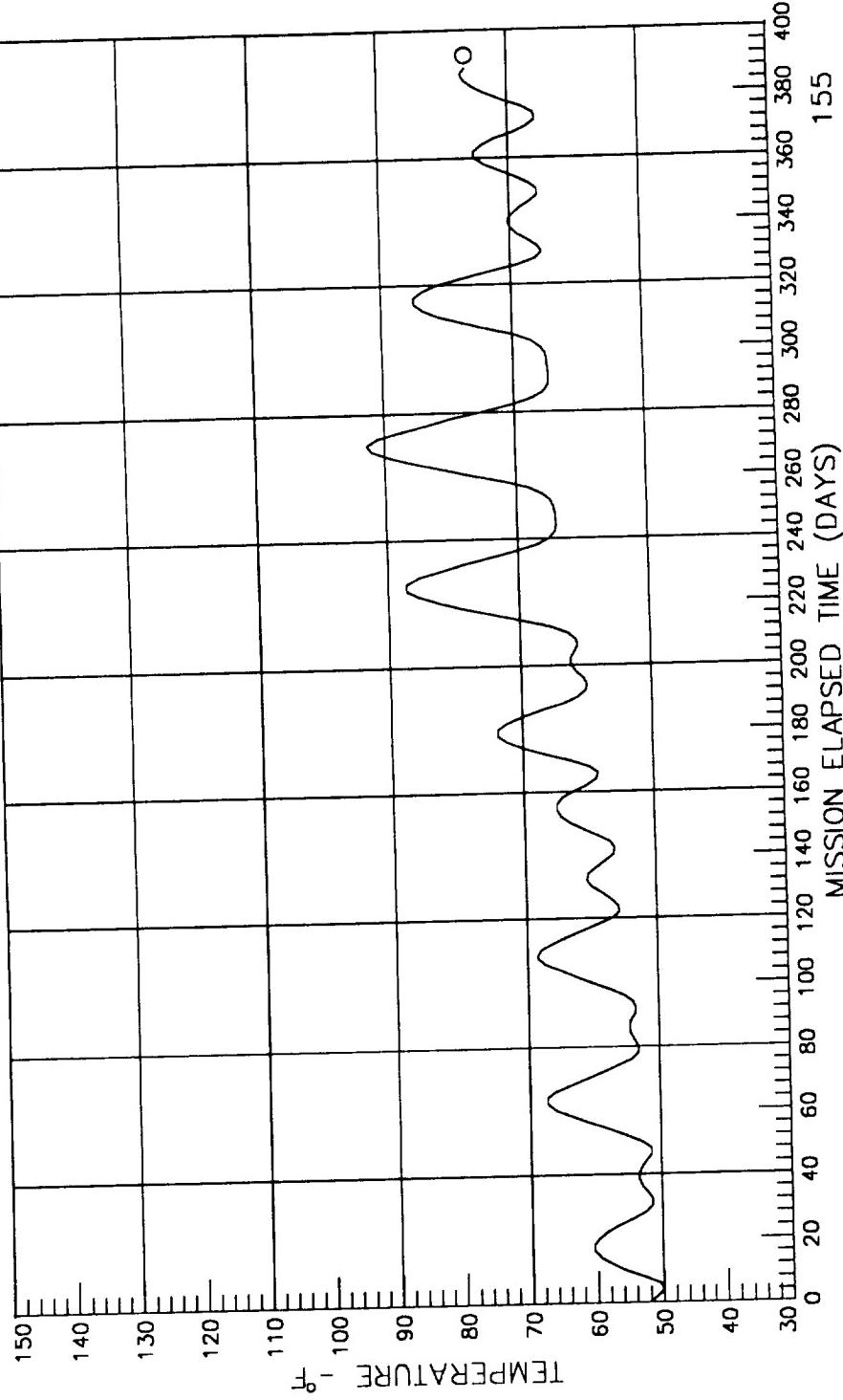


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 INITIATE SYSTEM

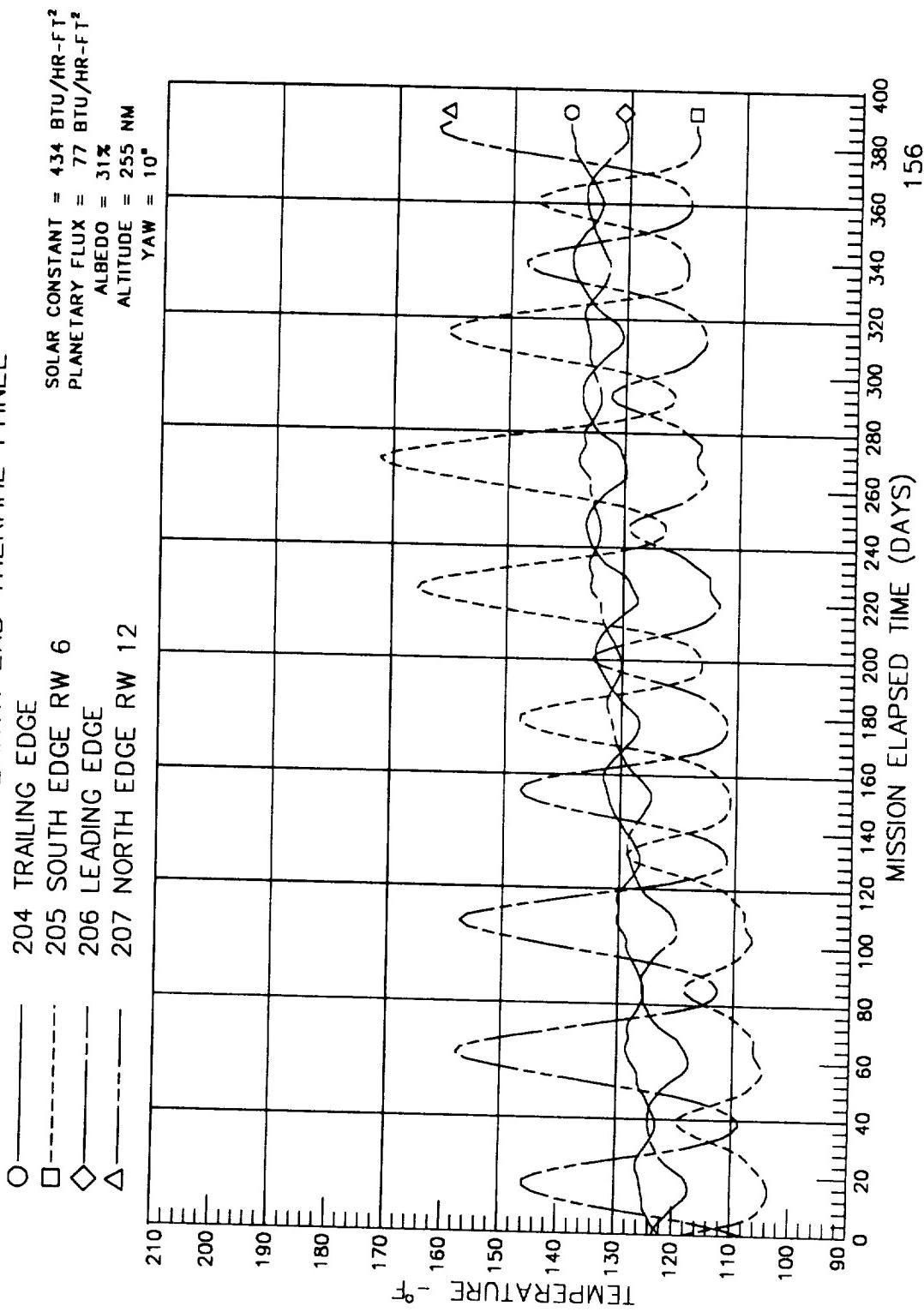
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

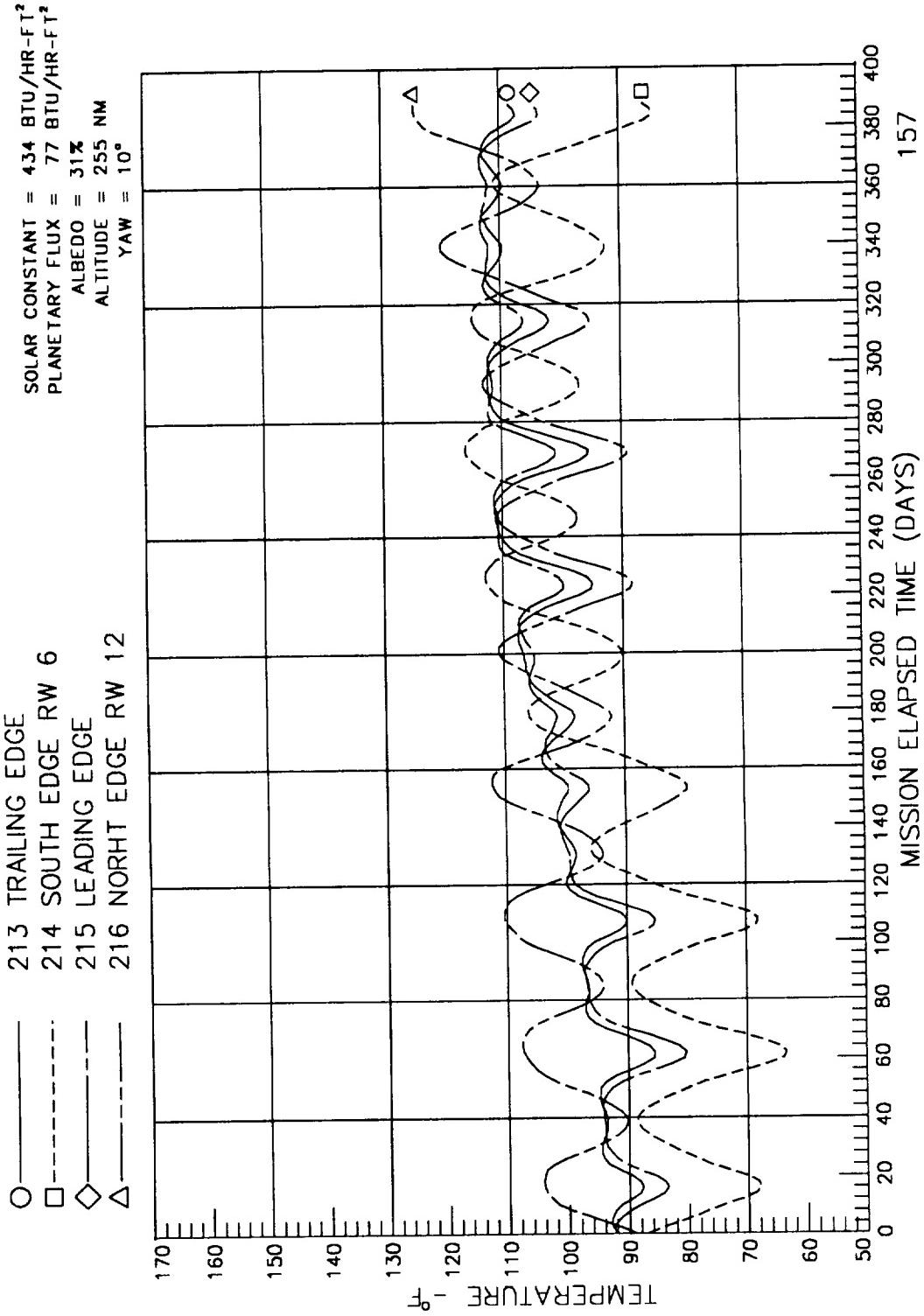
— 237 INITIATE SYSTEM



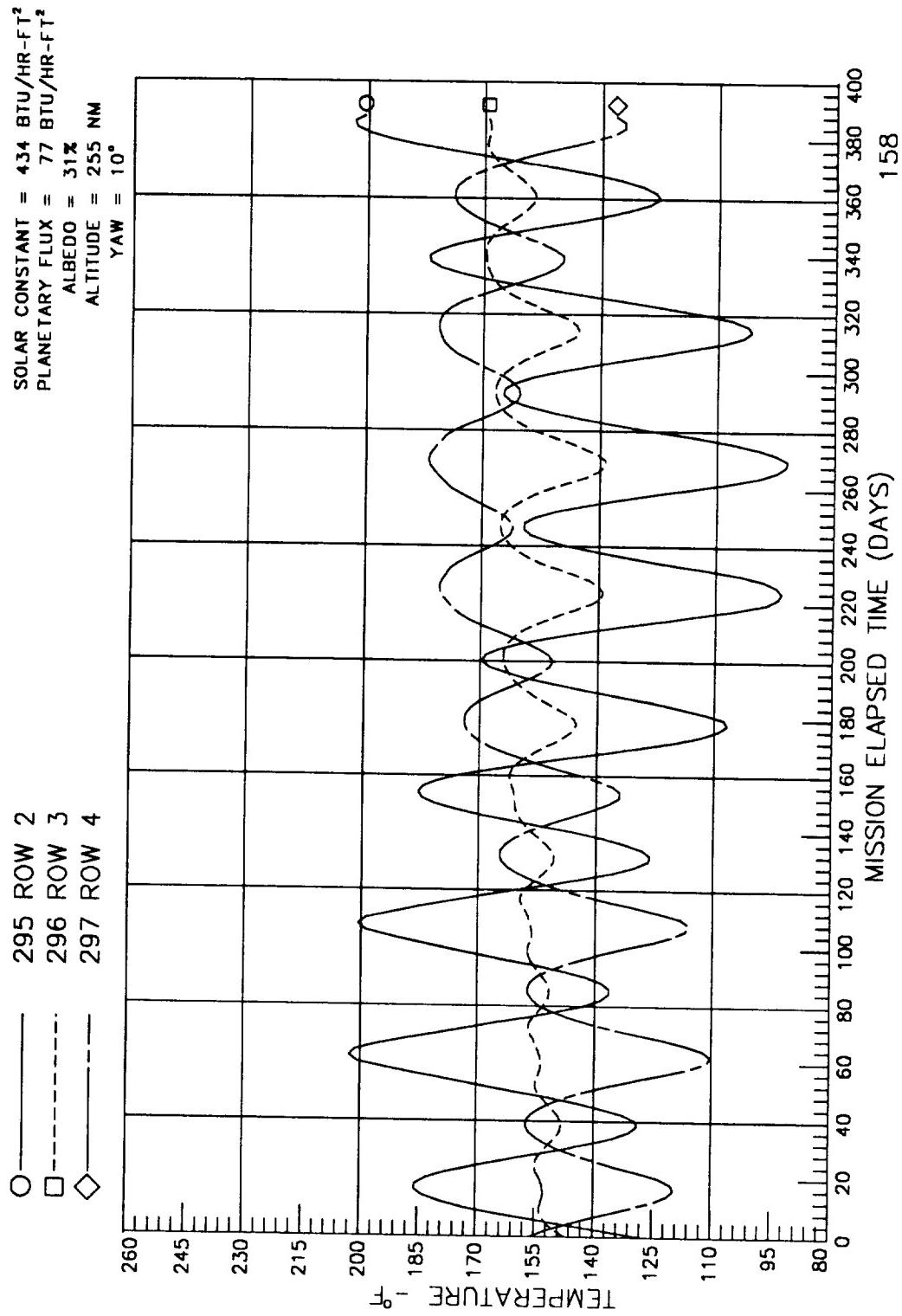
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END THERMAL PANEL



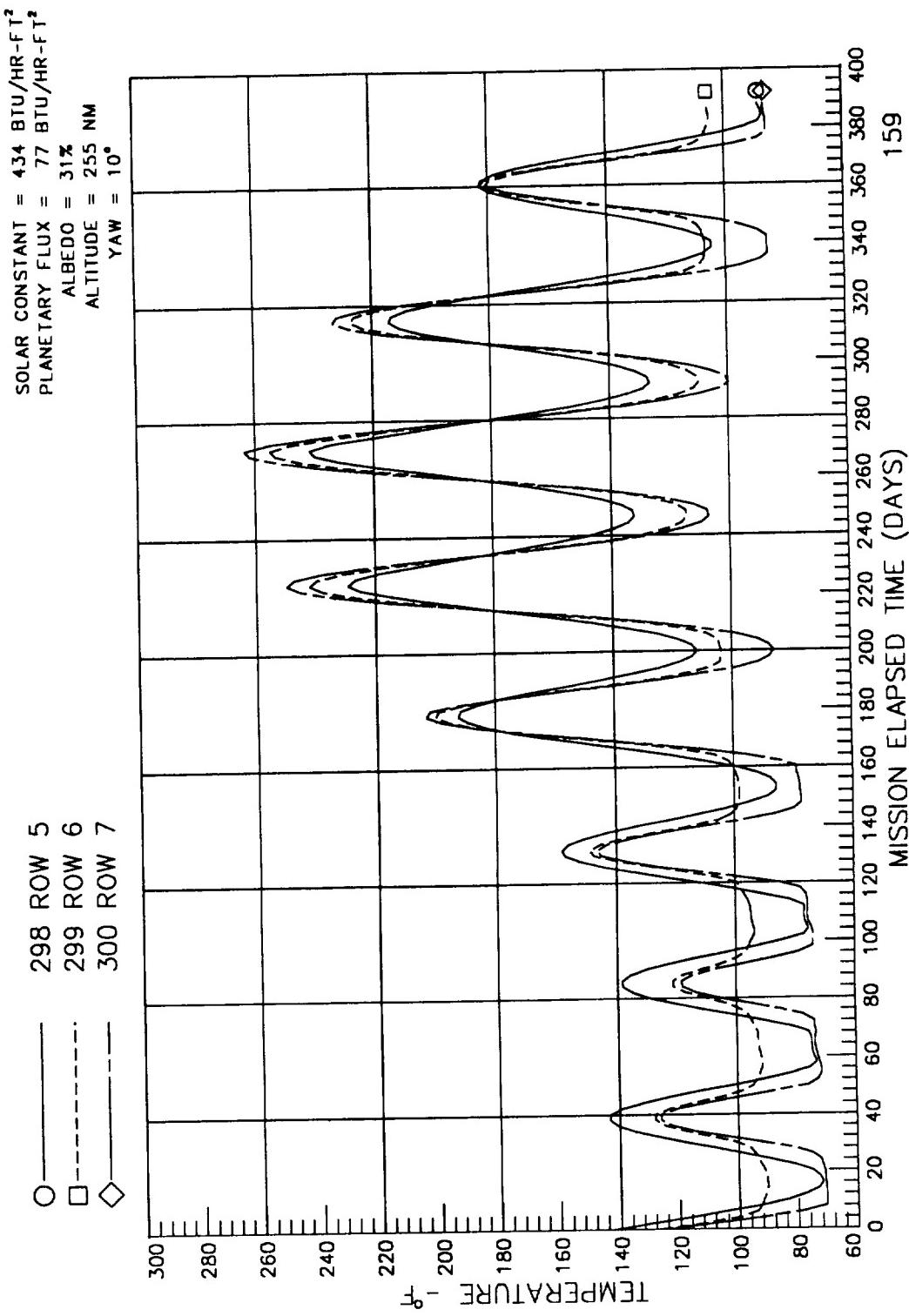
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END THERMAL PANEL



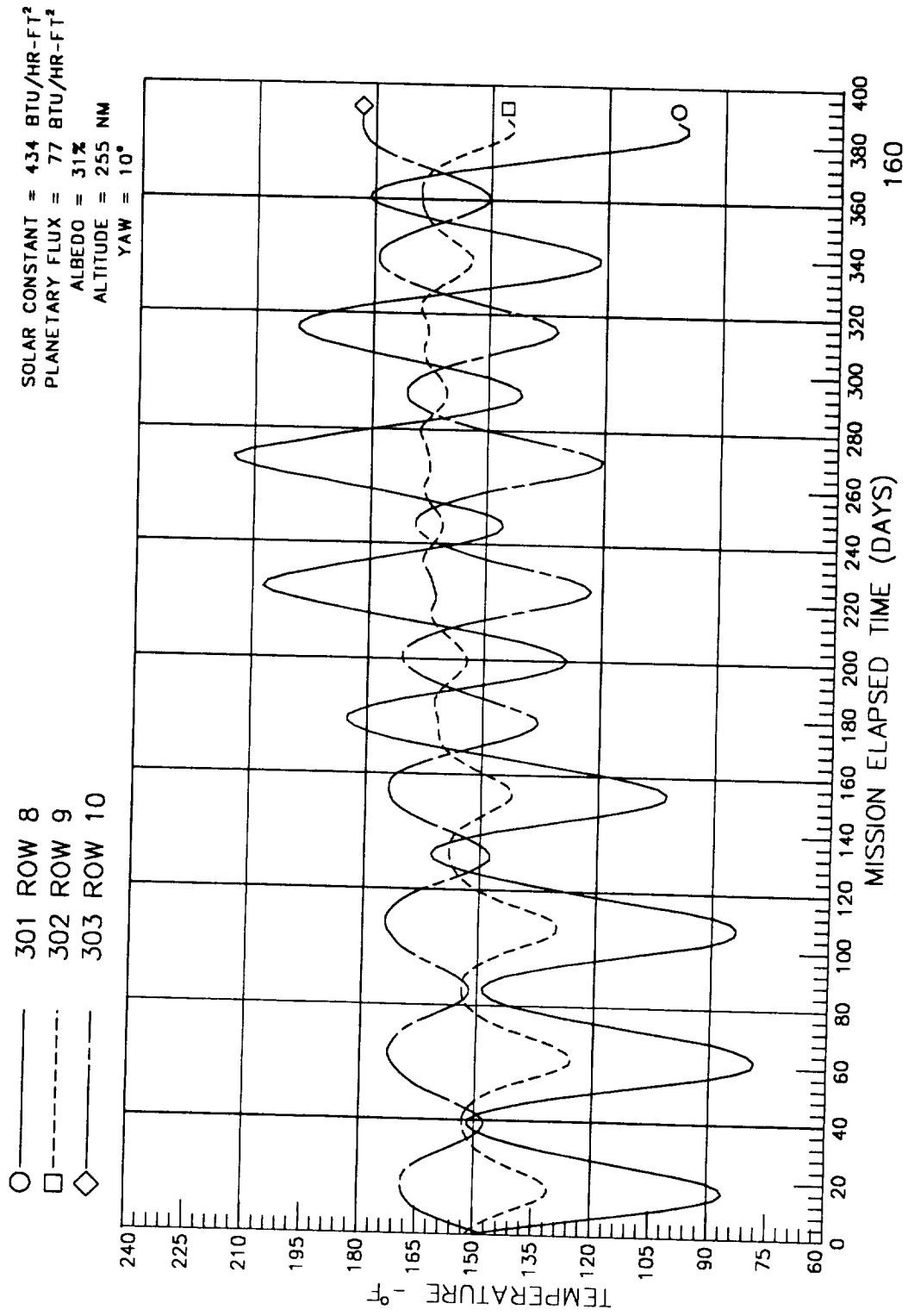
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END THERMAL PANEL SIDE



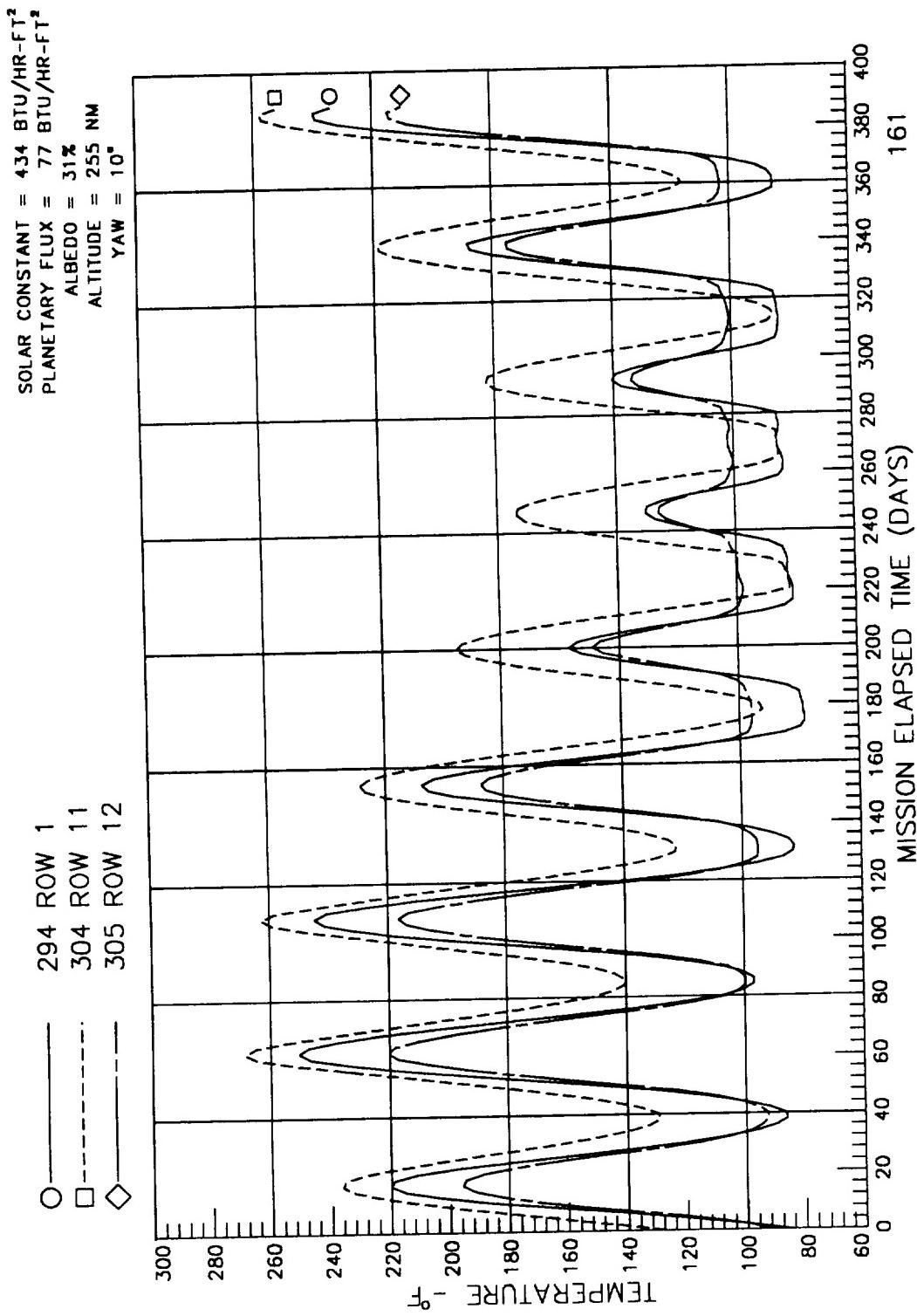
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END THERMAL PANEL SIDE



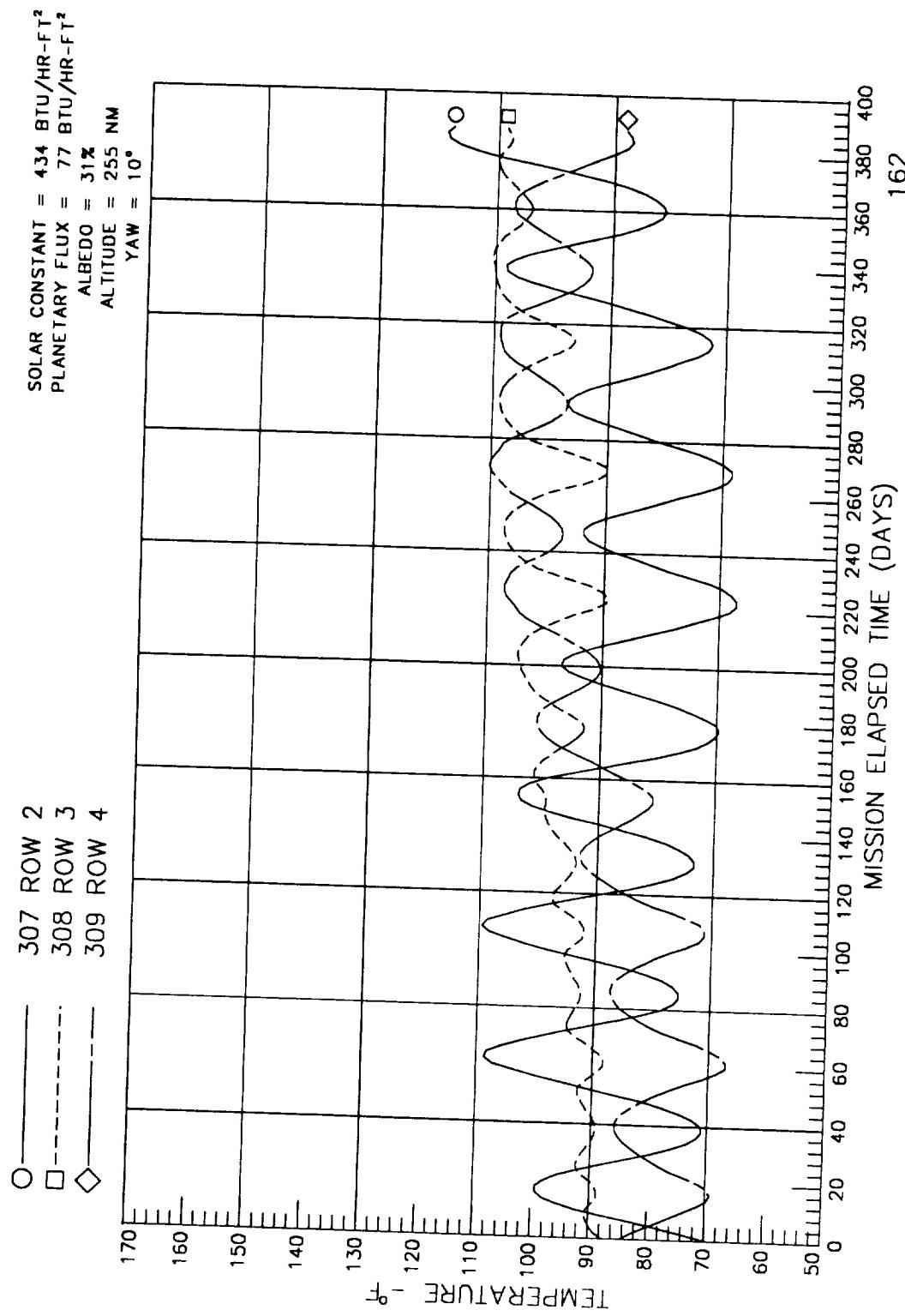
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END THERMAL PANEL SIDE



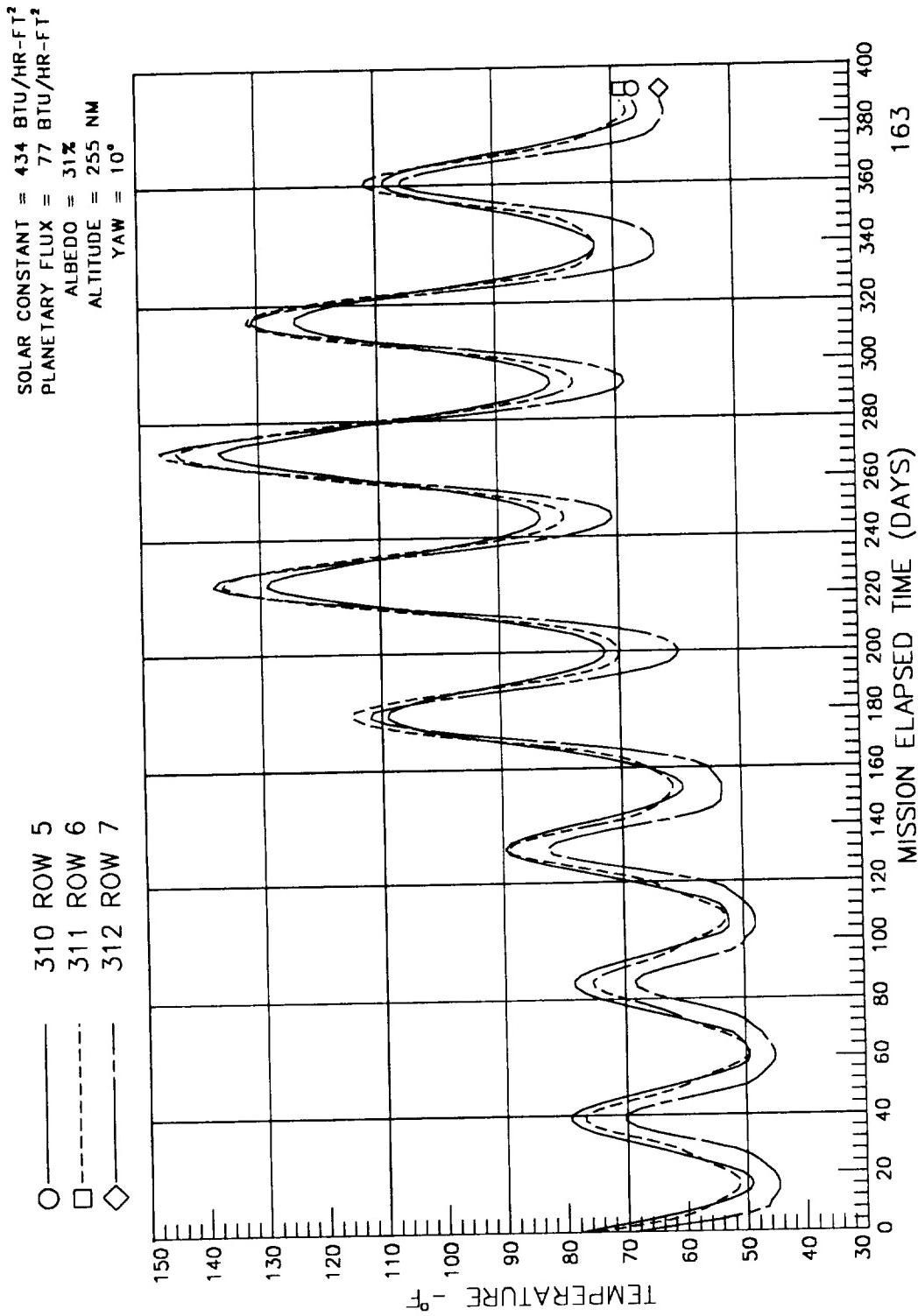
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END THERMAL PANEL SIDE



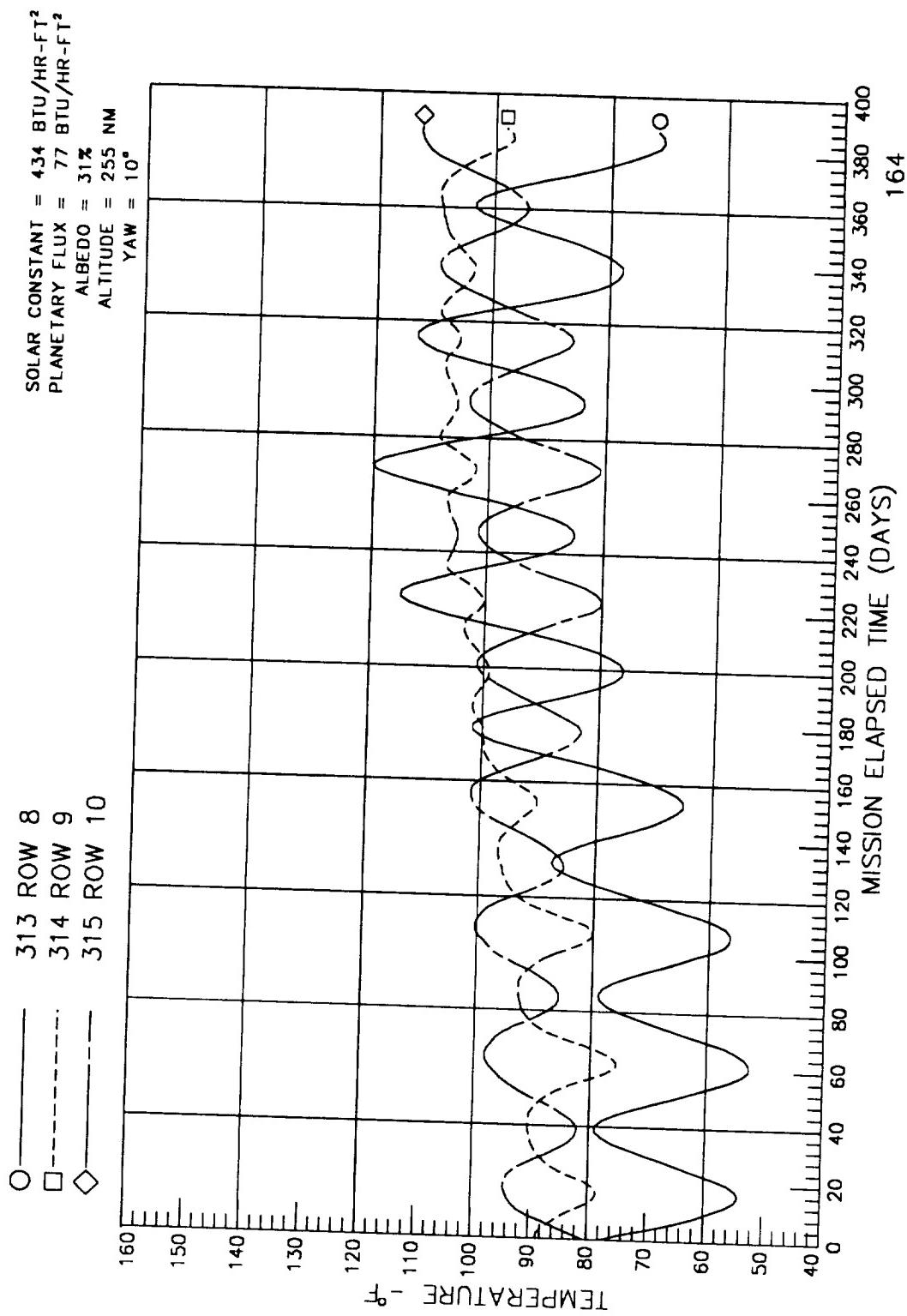
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END THERMAL PANEL SIDE



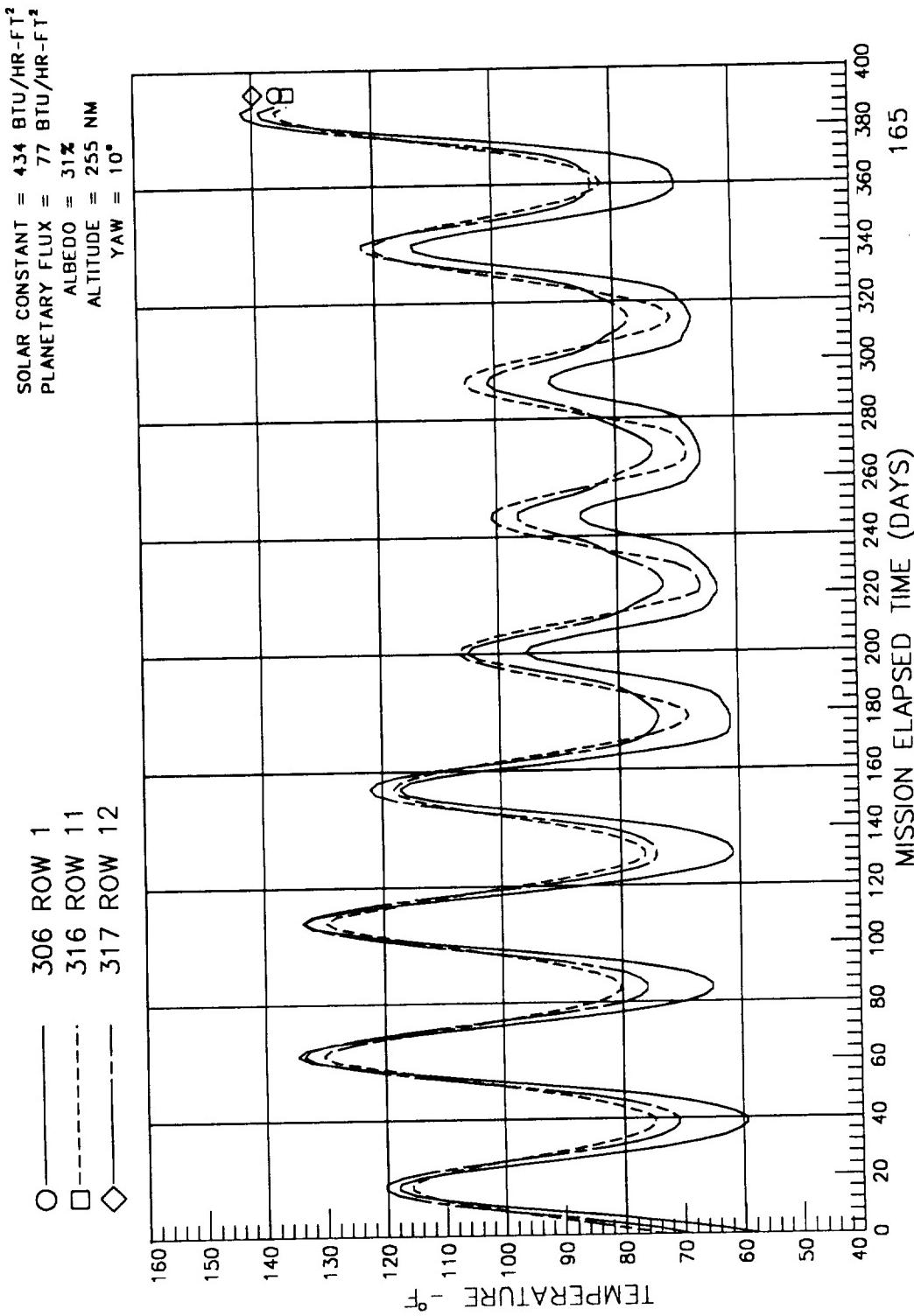
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END THERMAL PANEL SIDE



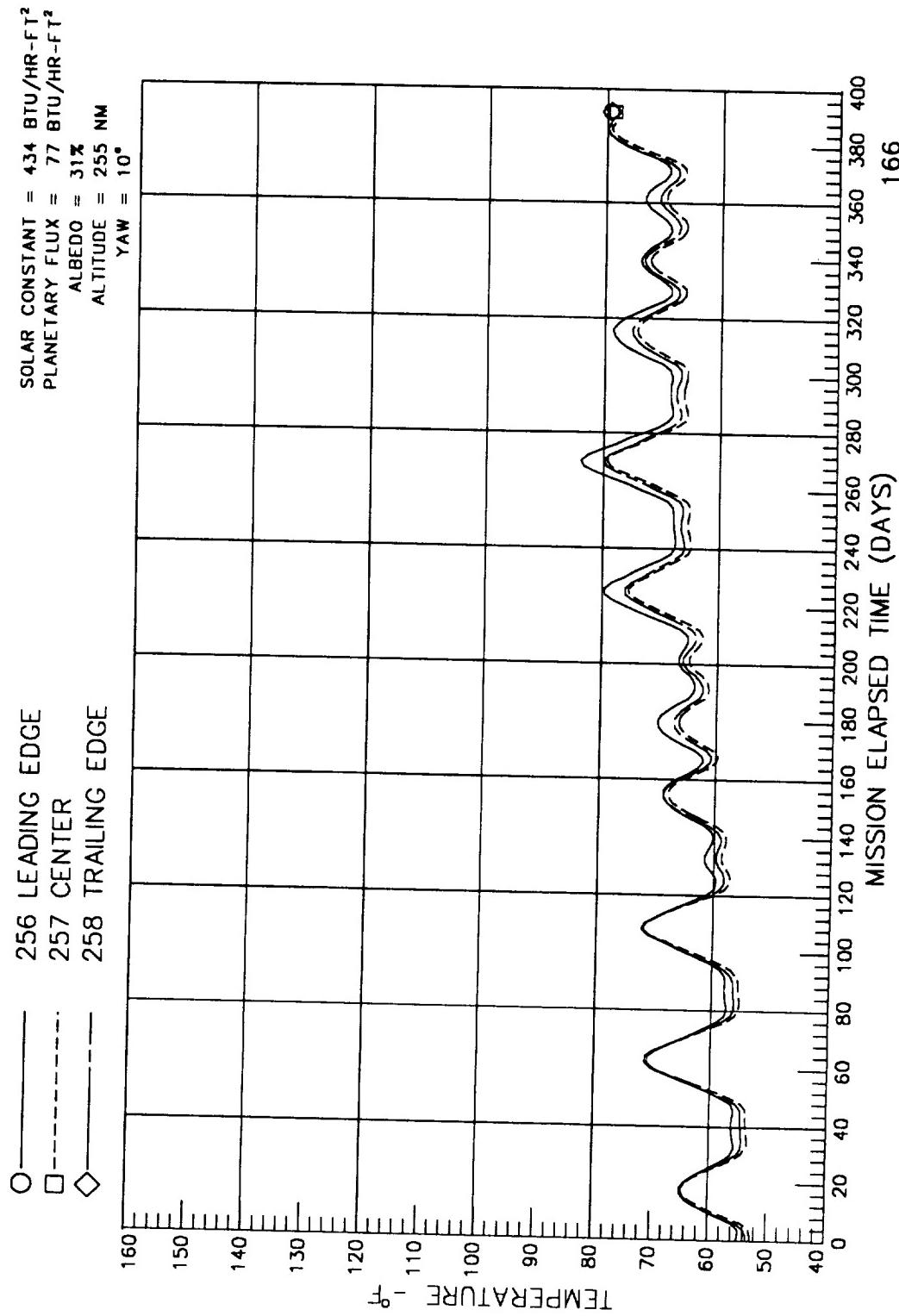
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END THERMAL PANEL SIDE



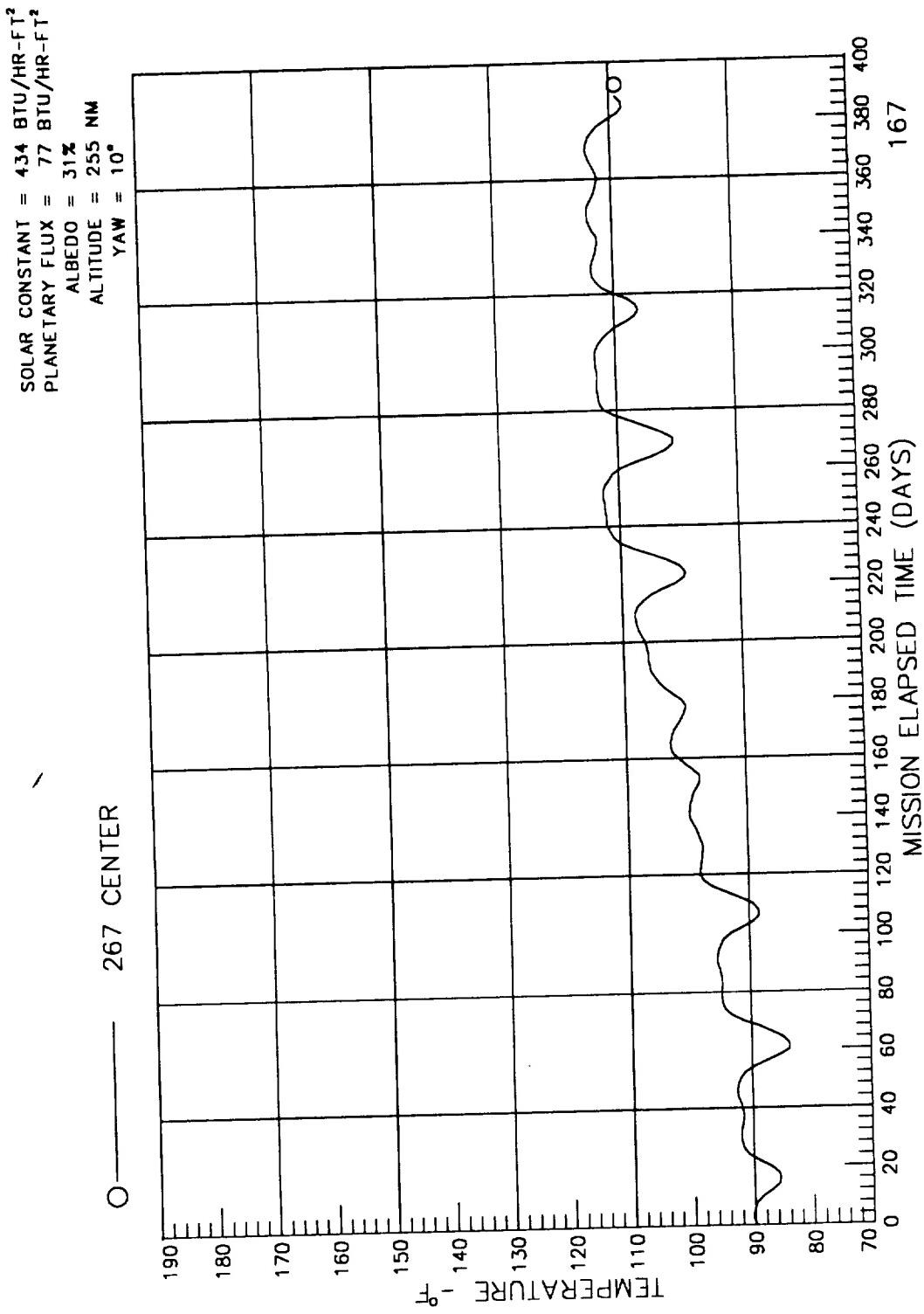
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END THERMAL PANEL SIDE



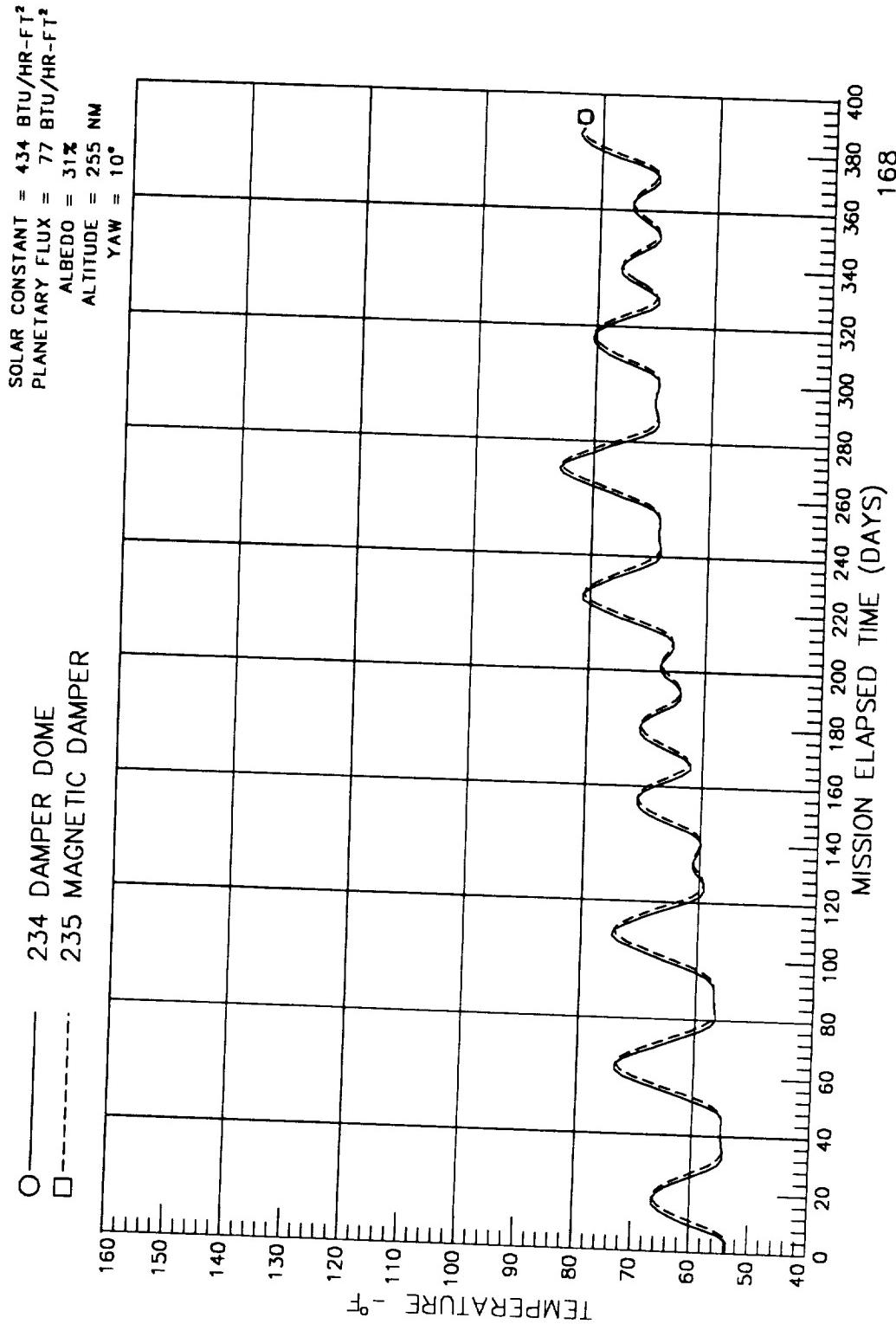
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH DUMMY COVER PLATES



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE DUMMY COVER PLATE CENTER



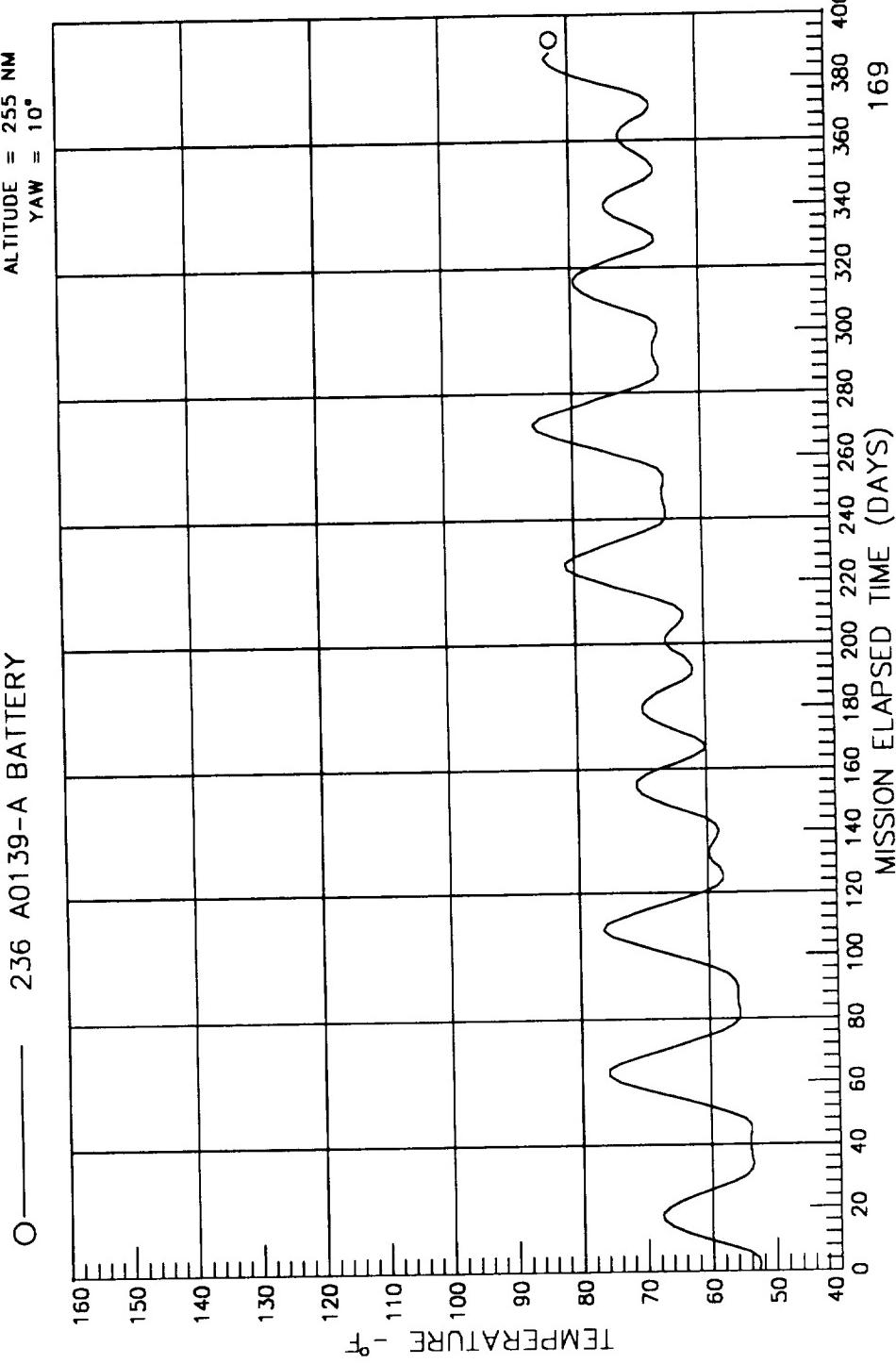
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 MAGNETIC DAMPER & SHROUD



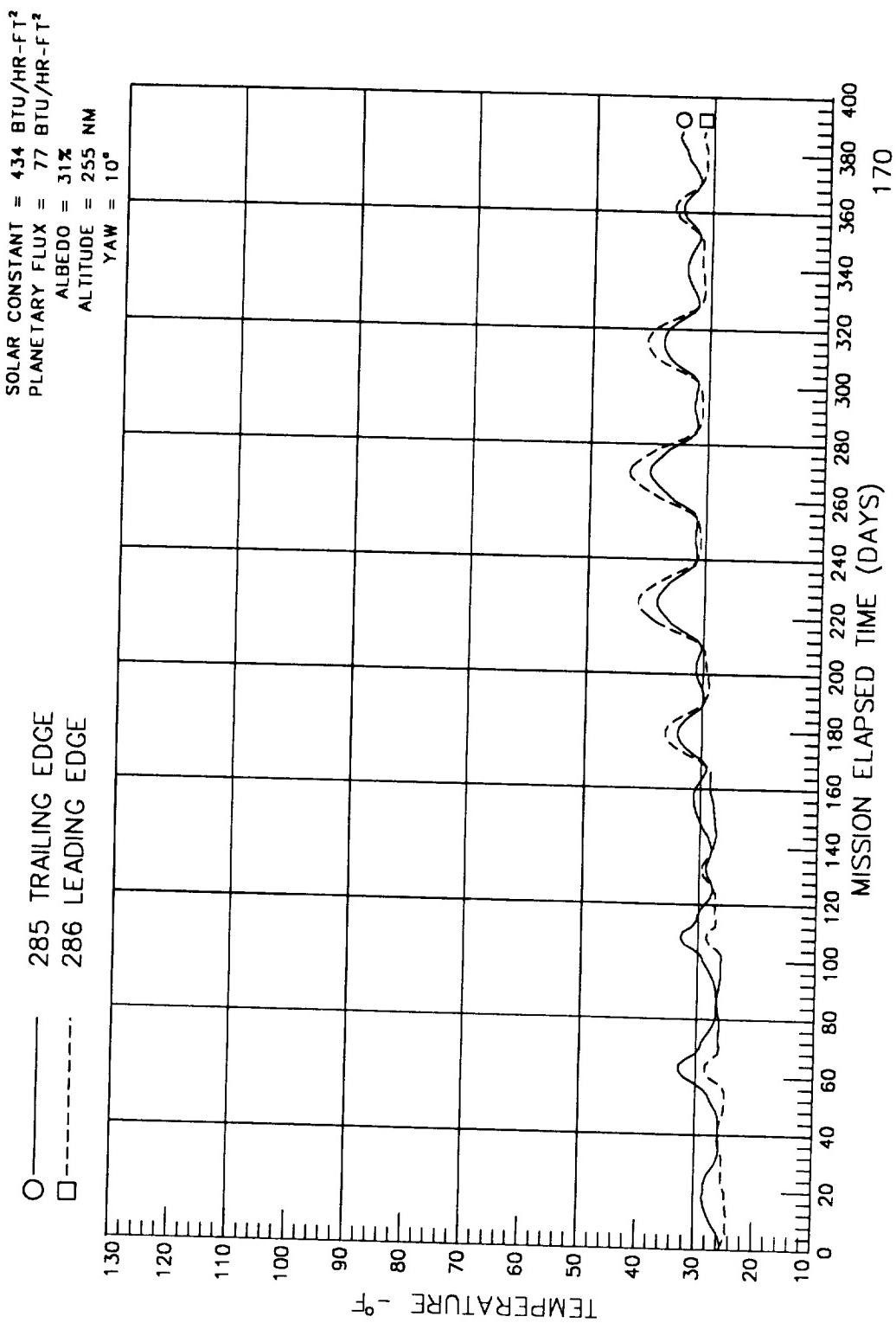
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 BATTERIES FOR A0139-A

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

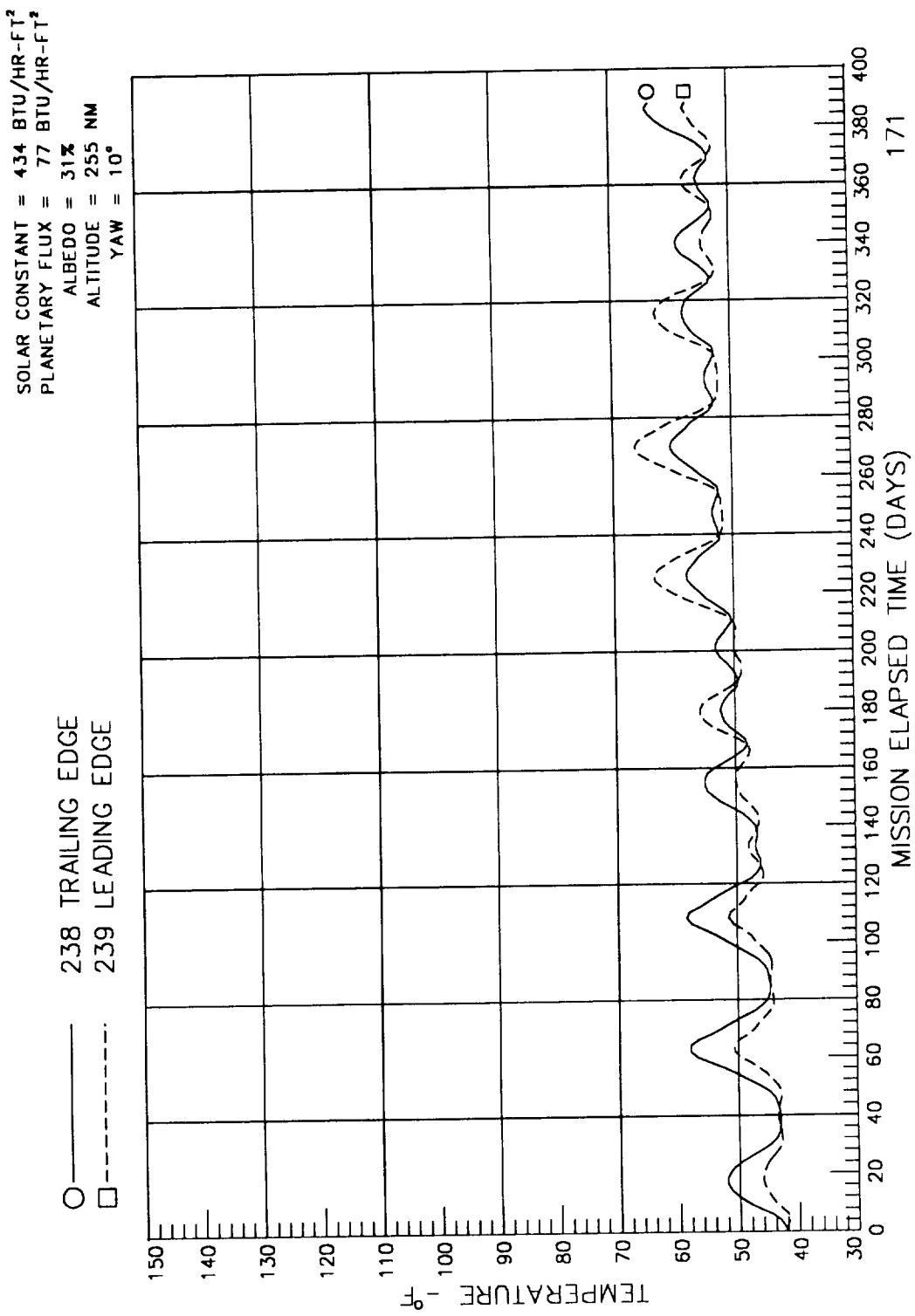
ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



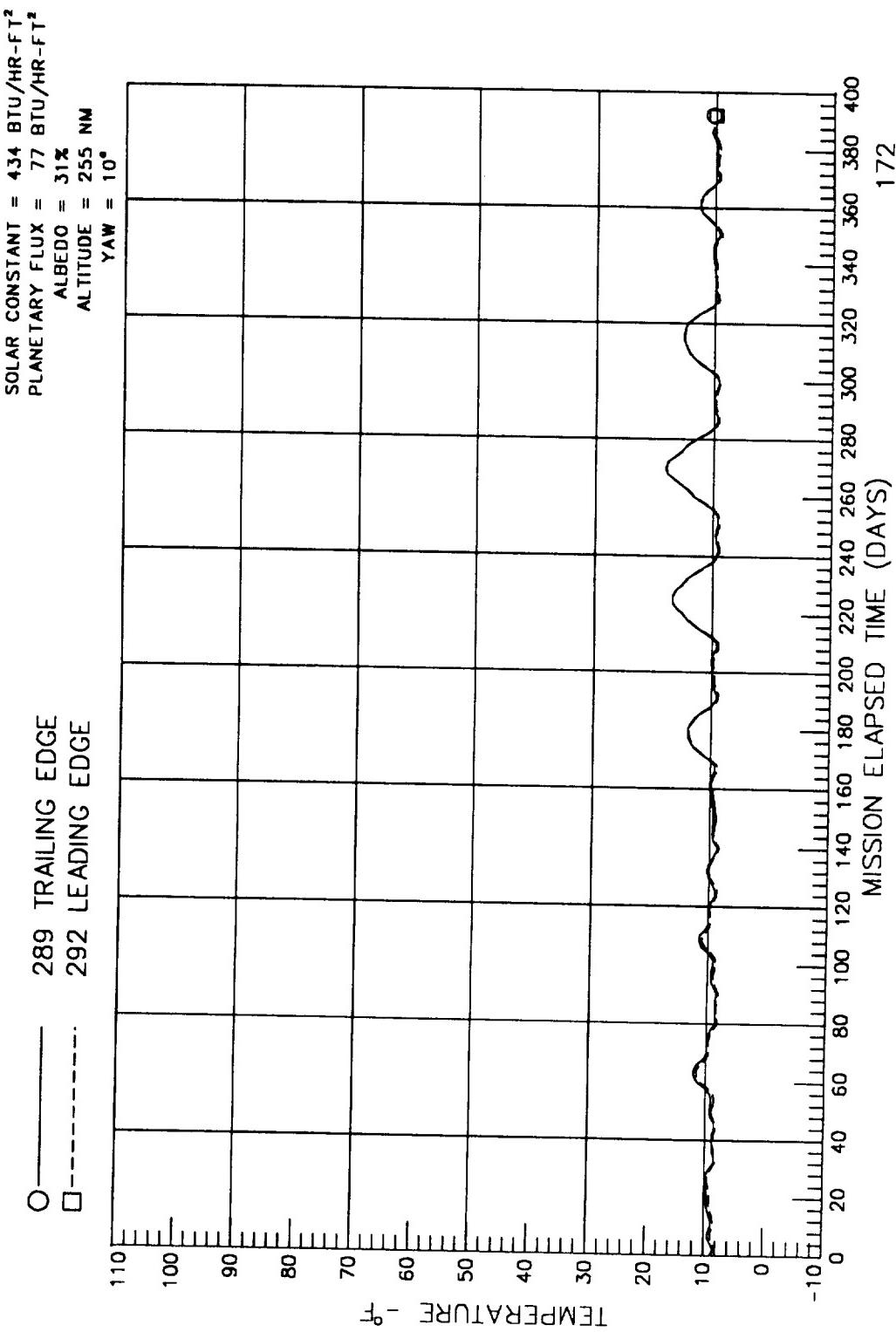
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 MAIN SCUFF PLATES



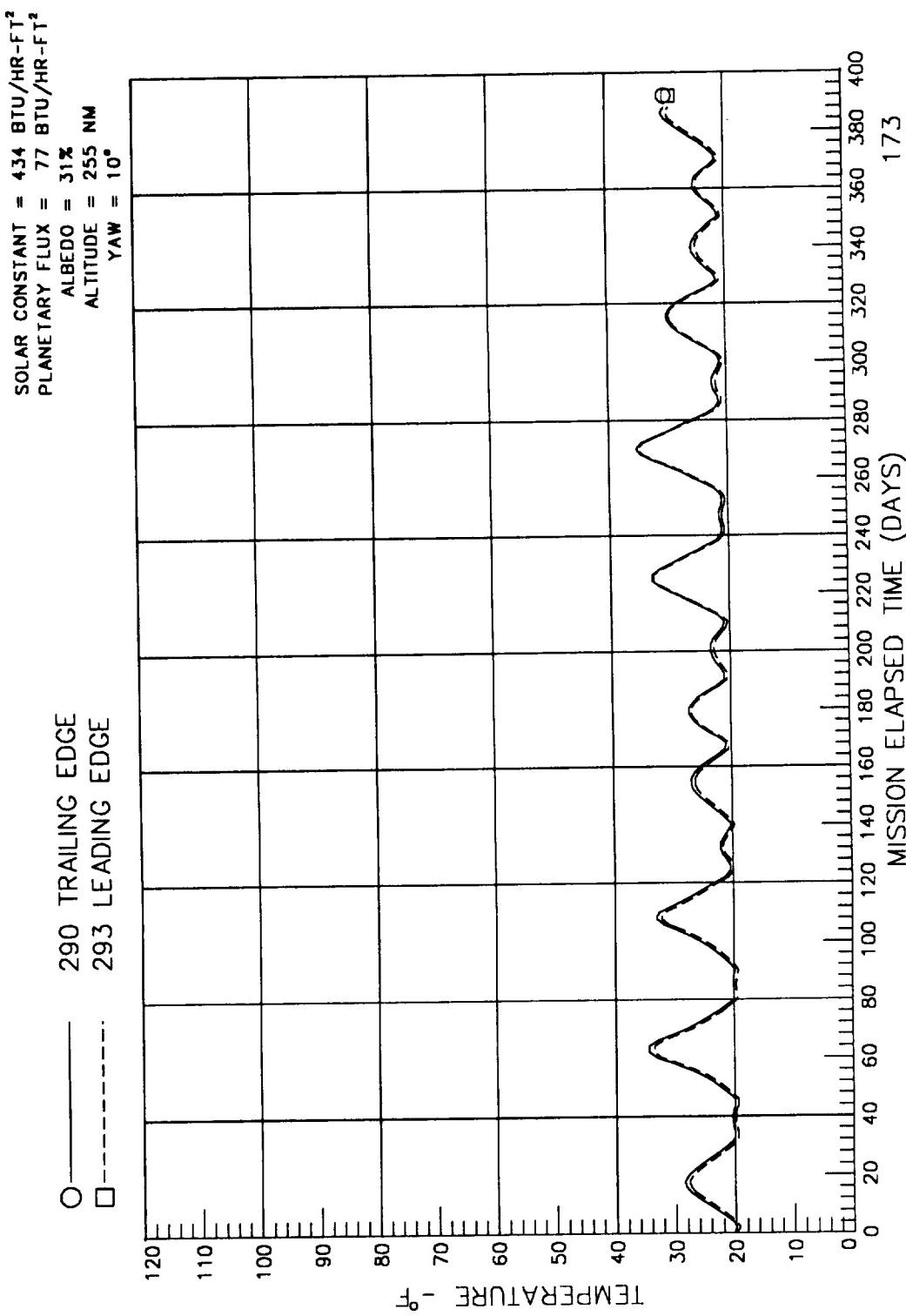
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
MAIN TRUNNION PINS



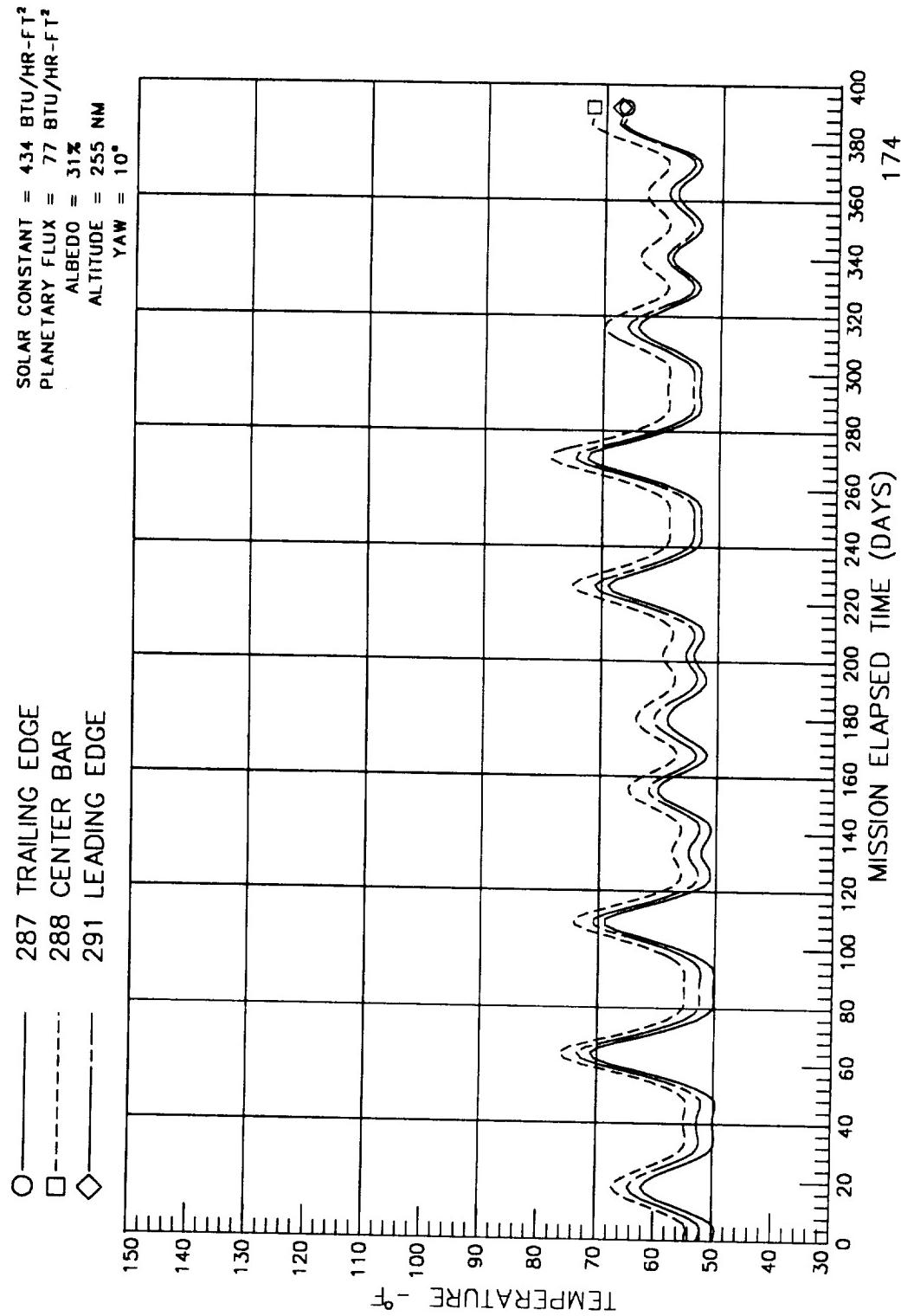
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 END SCUFF PLATES



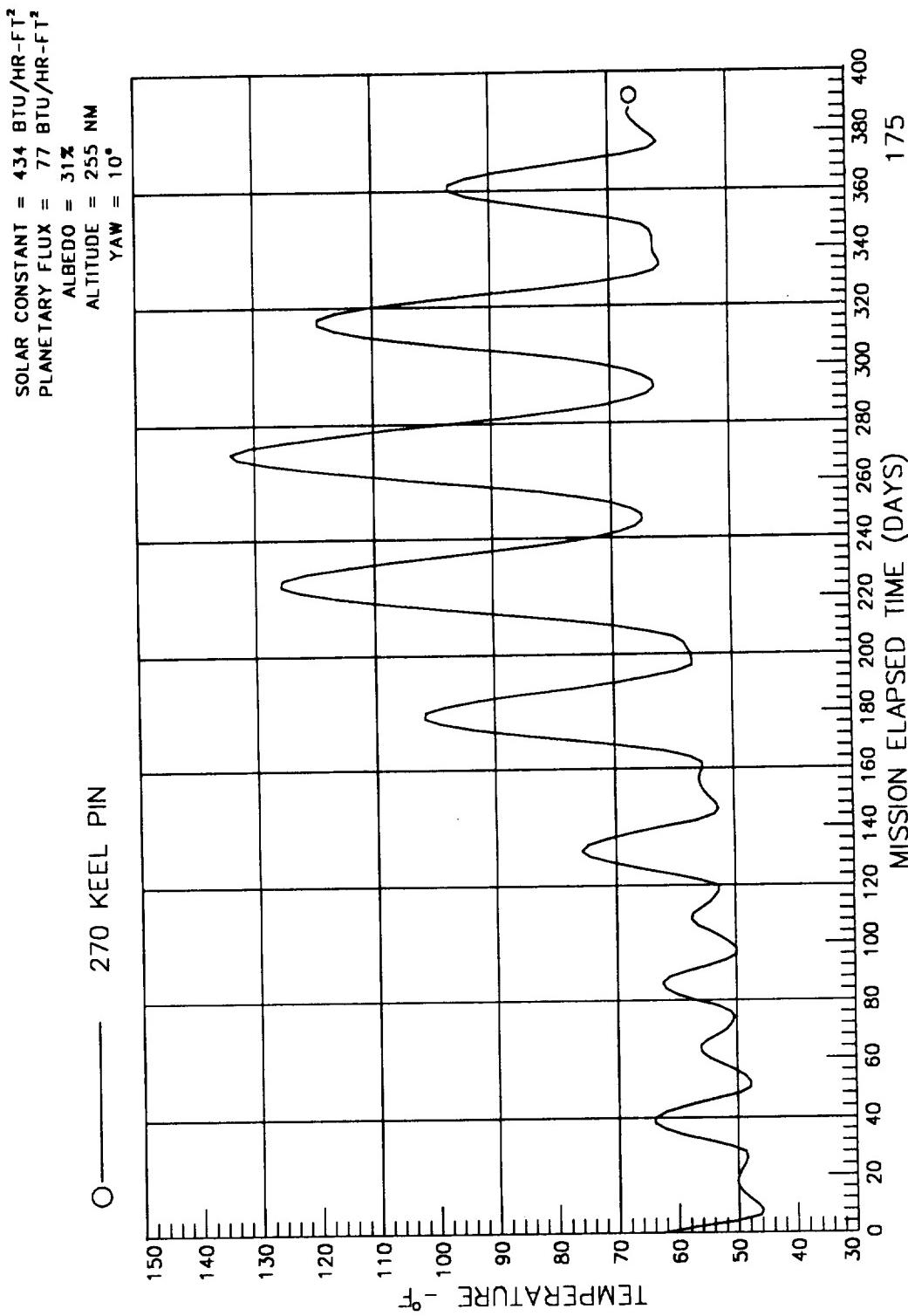
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 END TRUNNION PIN



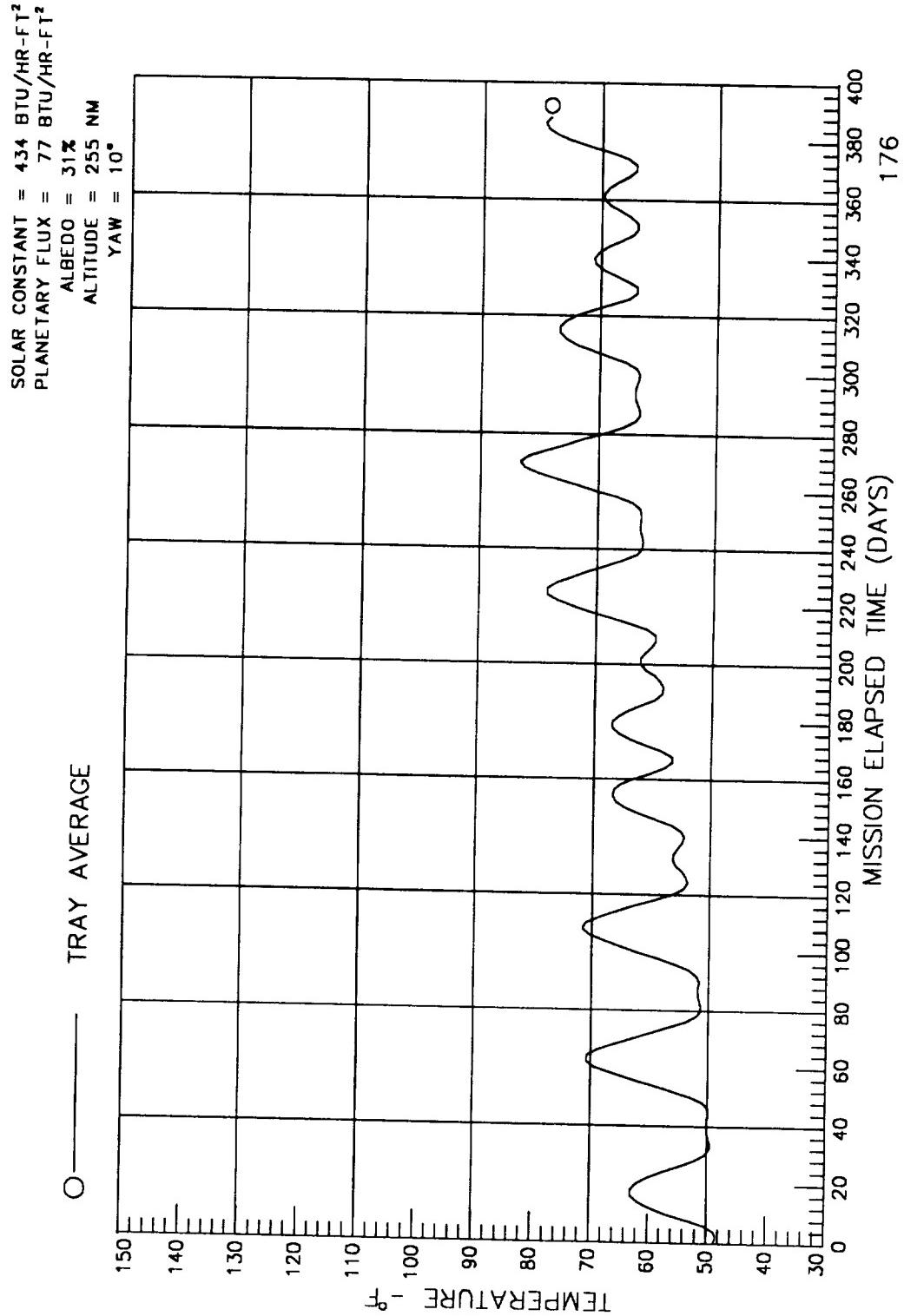
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 END SUPPORT BEAM



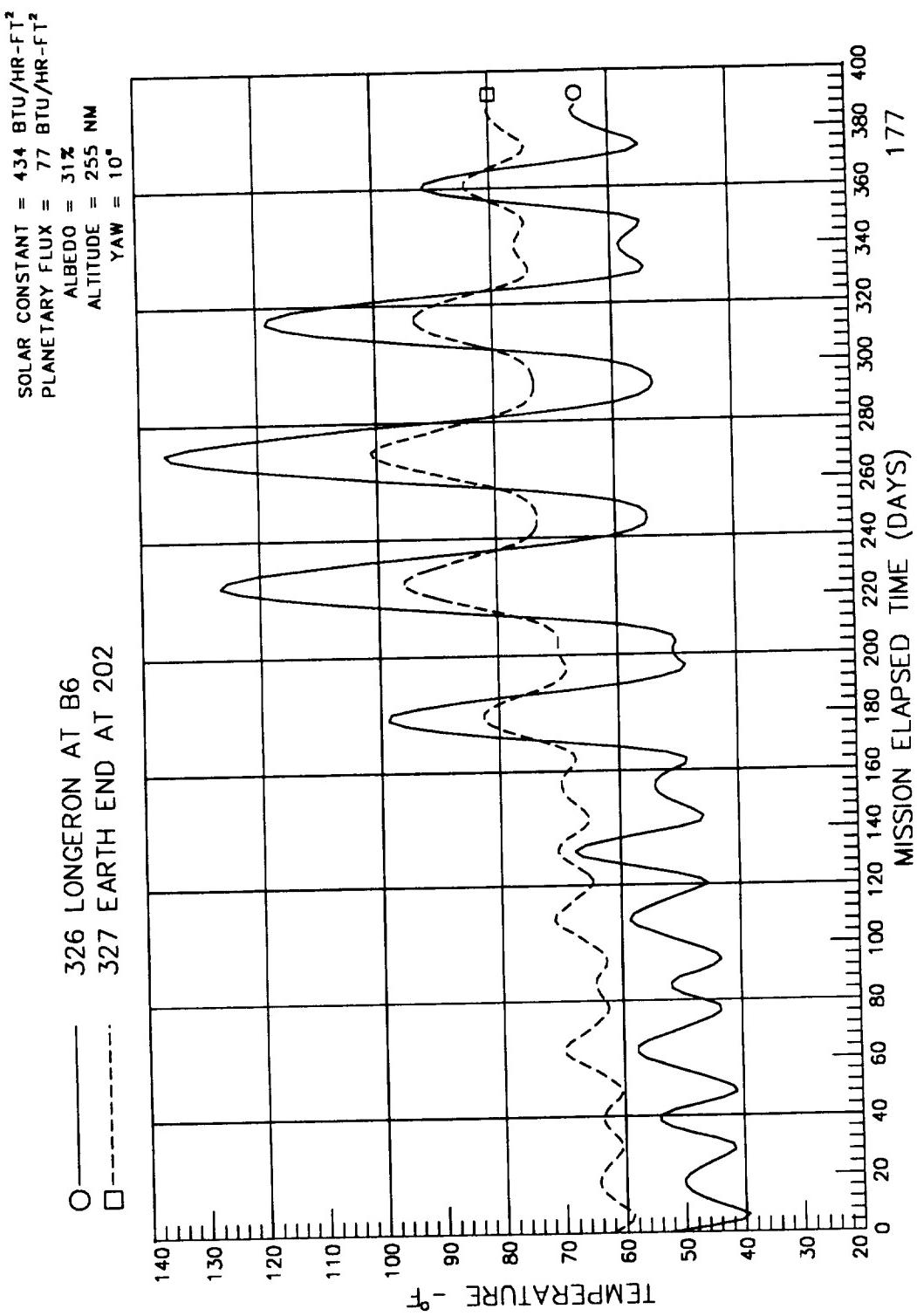
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
KEEL



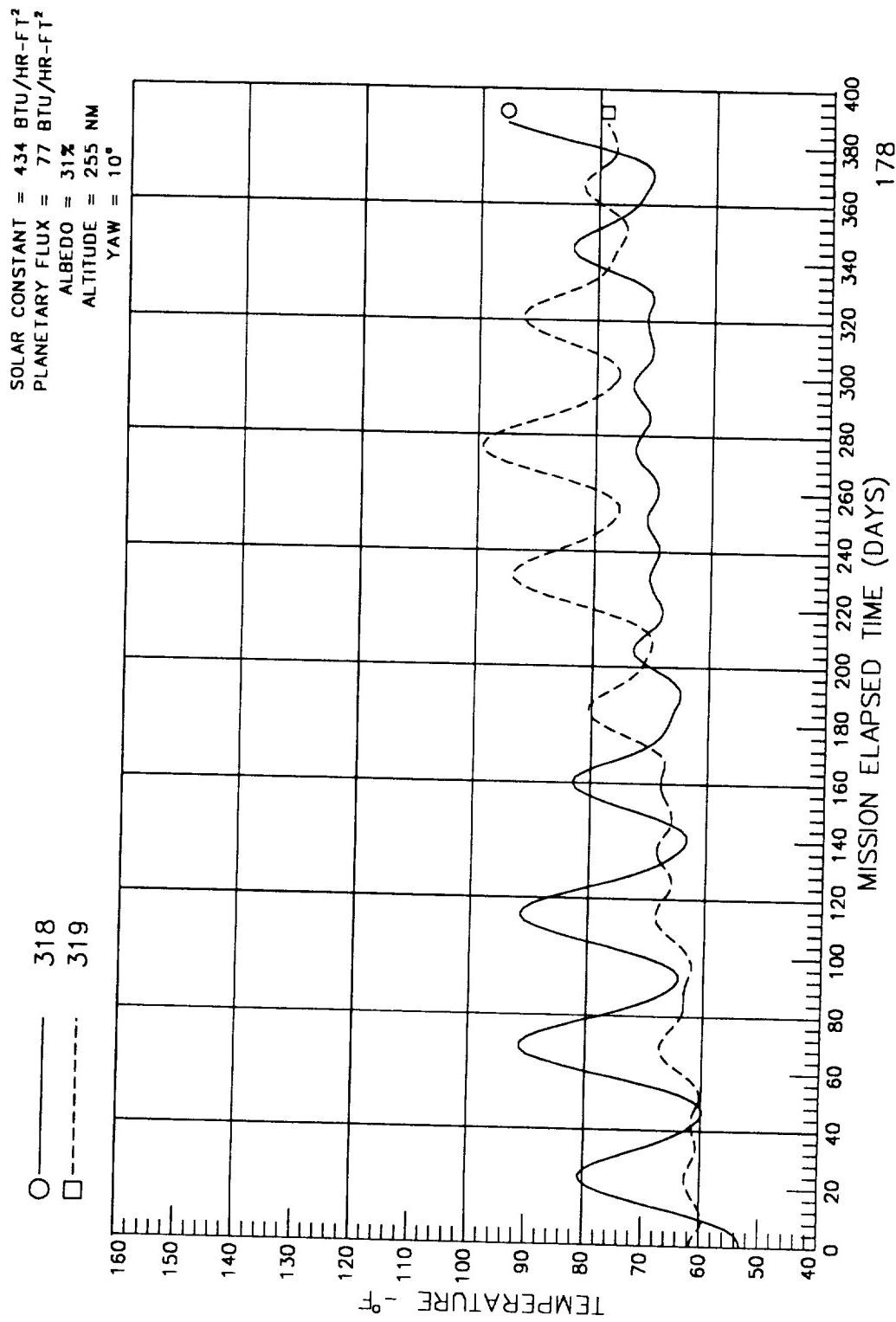
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 AVERAGE FOR TRAYS 1 - 72



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 T/C NODES EE & LG 6-7



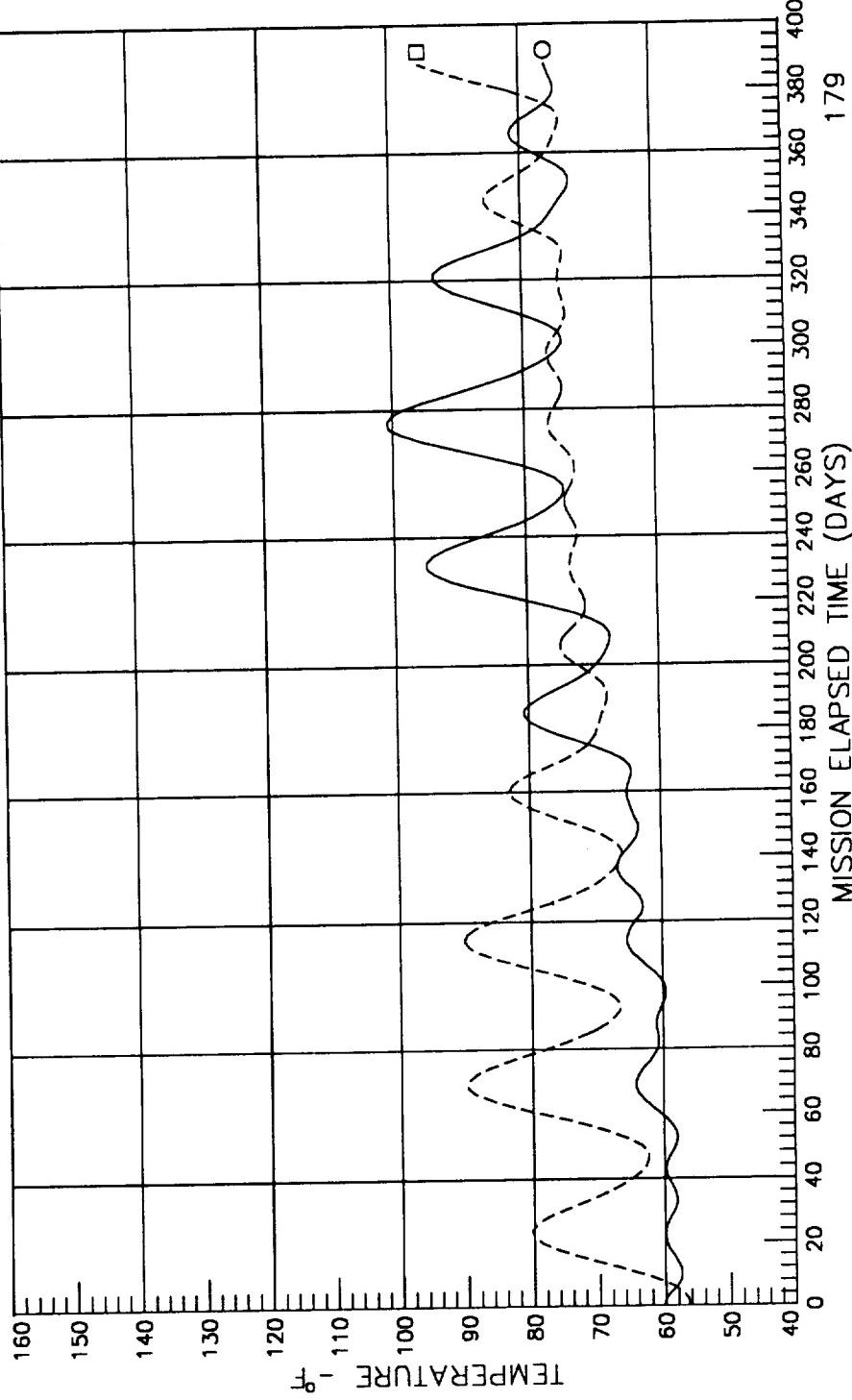
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 INTERIOR STRUTS



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 INTERIOR STRUTS

SOLAR CONSTANT = 4.34 BTU/HR-F²
 PLANETARY FLUX = 77 BTU/HR-F²
 ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°

○ ----- 320
 □ ----- 321



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 INTERIOR STRUTS

SOLAR CONSTANT = 434 BTU/HR-FT²

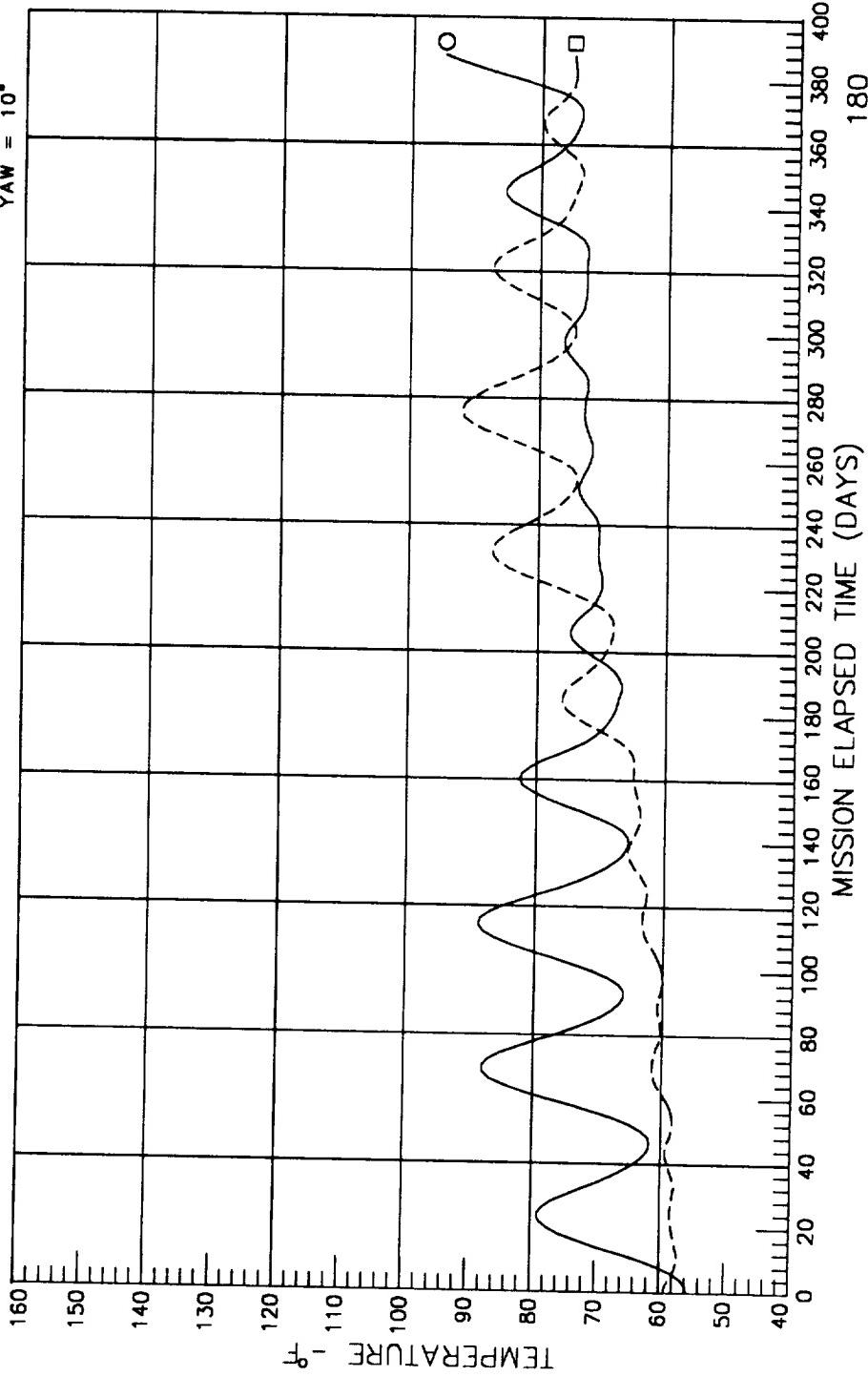
PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%

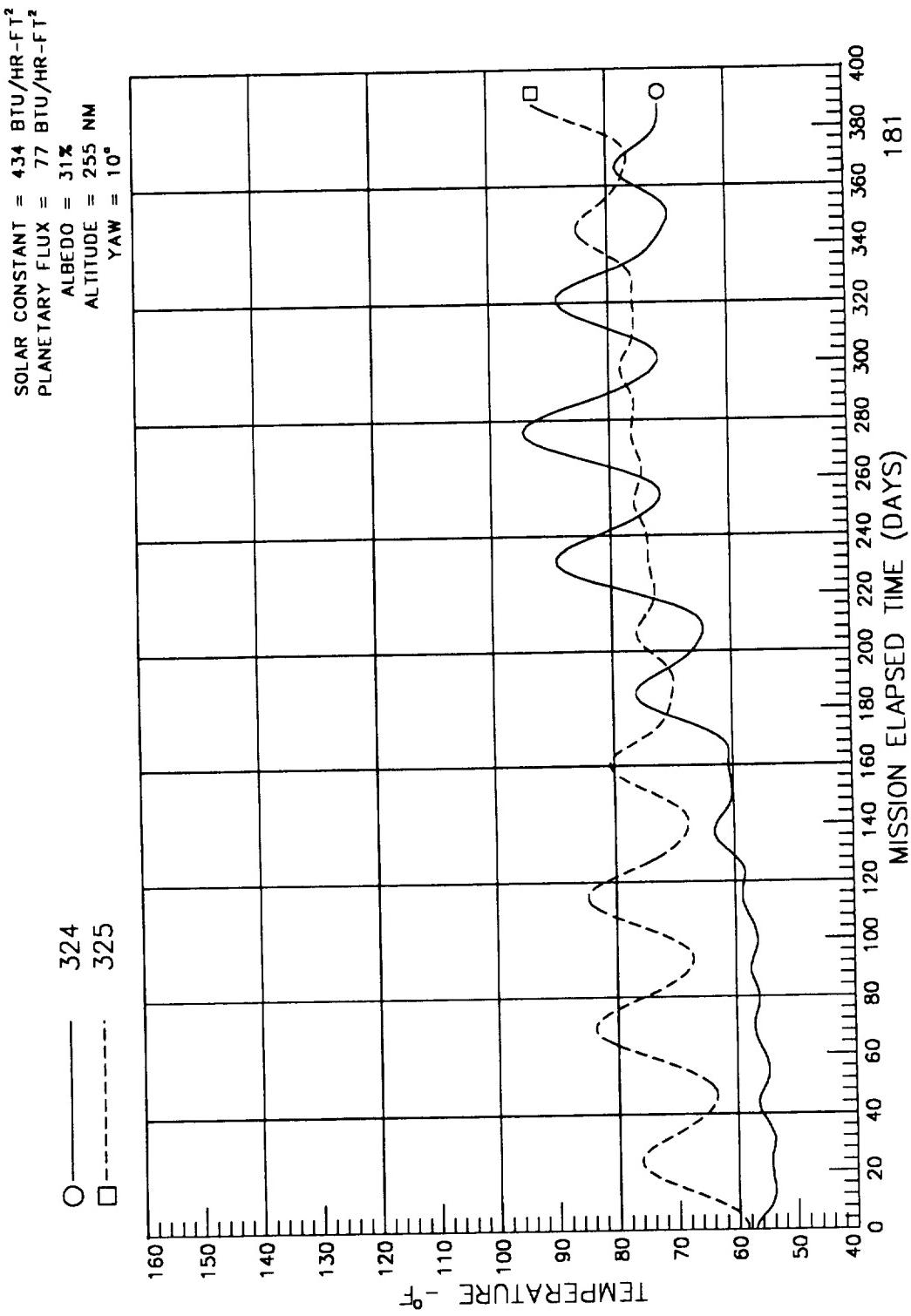
ALTITUDE = 255 NM

YAW = 10°

— 322
 - - - 323

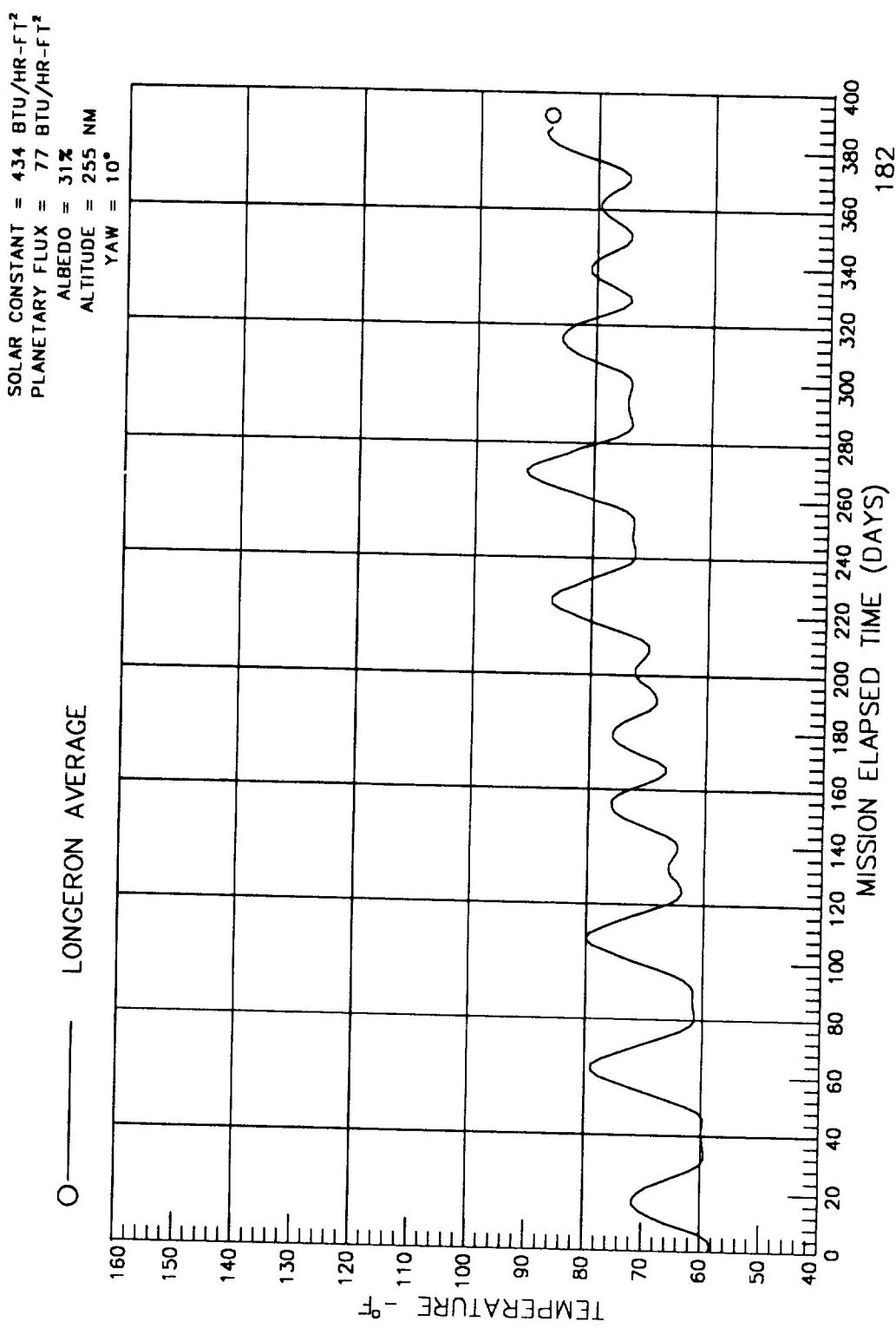


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 INTERIOR STRUTS



181

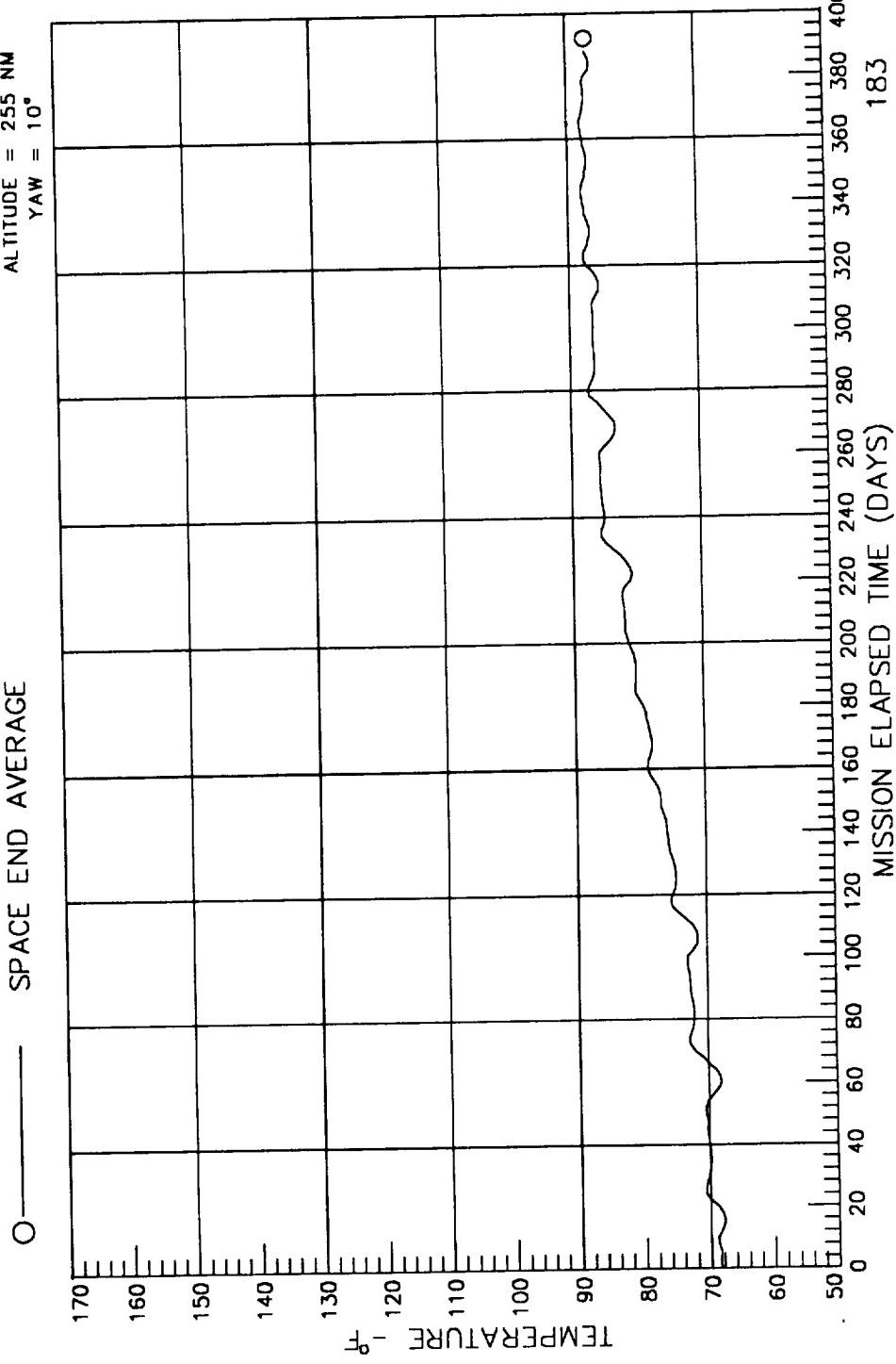
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 LONGERON AVERAGE



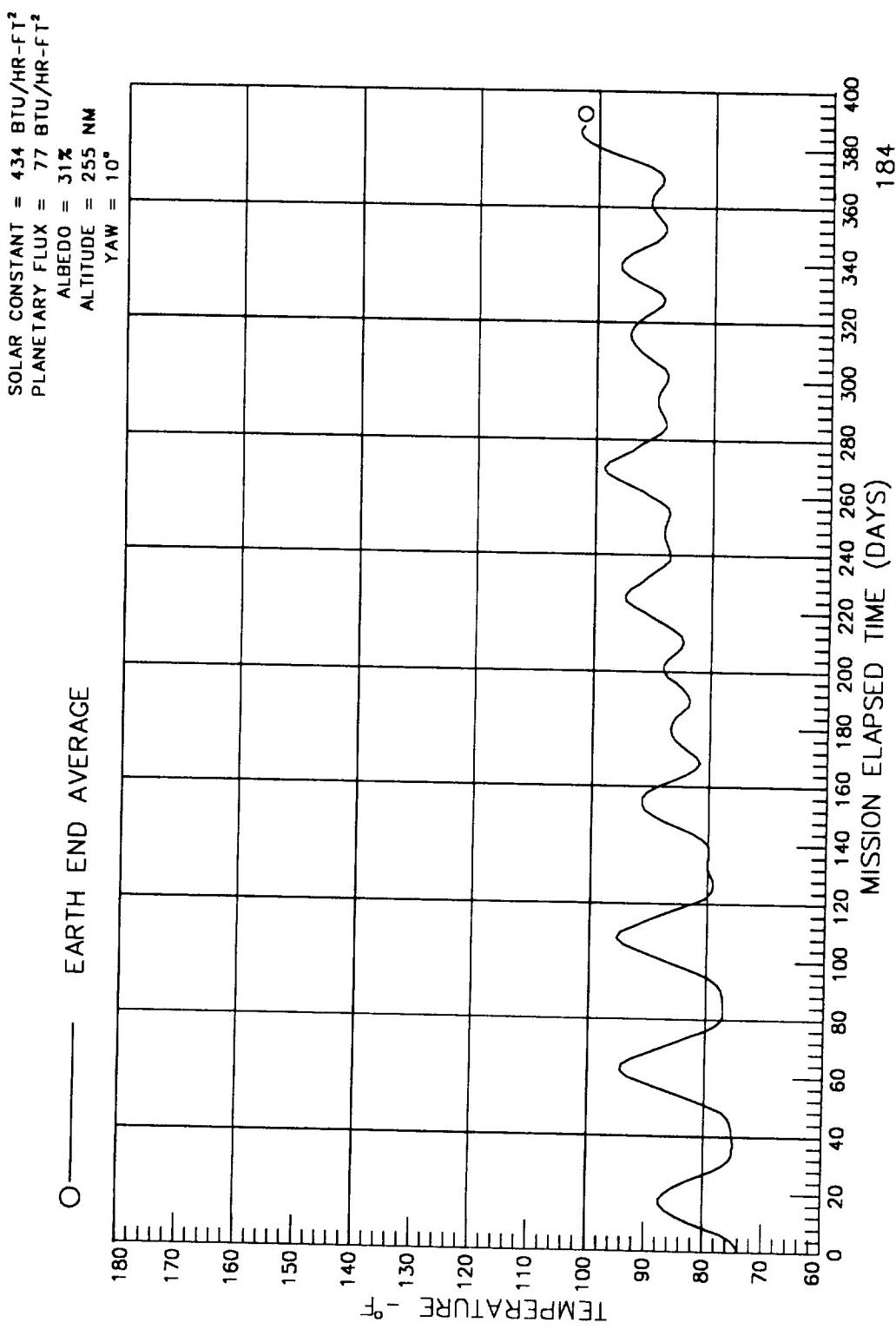
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 SPACE END AVERAGE

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 255 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 4/7/84 - 5/2/85
 EARTH END AVERAGE



APPENDIX D

CHARTS *END OF MISSION TEMPERATURES*

This page intentionally left blank

APPENDIX D
INDEX
END OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	CHART NUMBER
A1	A0175	Gr/Polyemide & Gr/Epoxy Composites Structure Boundary	1, 91, 271 163, 164, 175, 176	D - 1 D - 87
A2	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	2, 92 164, 165, 176, 177	D - 7 D - 91
A3	A0187-	Chemistry of Micrometeoroids Structure Boundary	3, 93 165, 166, 177, 178	D - 13 D - 95
A4	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	4, 94 166, 167, 178, 179	D - 19 D - 99
A5	S0001	Space Debris Impact Structure Boundary	5, 95 167, 168, 179, 180	D - 25 D - 103
A6	S0001	Space Debris Impact Structure Boundary	6, 96 168, 169, 180, 181	D - 31 D - 107
A7	A0175	Gr/Polyemide & Gr/Epoxy Composites Structure Boundary	7, 97, 272 169, 170, 181, 182	D - 37 D - 111
A8	A0171	Solar Array Materials (Passive) Structure Boundary	8, 98 170, 171, 182, 183	D - 43 D - 115
A9	S0069	Thermal Control Surfaces Structure Boundary	9, 99 171, 172, 183, 184	D - 49 D - 119
A10	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	10, 100 172, 173, 184, 185	D - 55 D - 123
A11	A0187-	Chemistry of Micrometeoroids Structure Boundary	11, 101 173, 174, 185, 186	D - 61 D - 127
A12	S0001	Space Debris Impact Structure Boundary	12, 102 163, 174, 175, 186	D - 67 D - 131
B1	S0001	Space Debris Impact Structure Boundary	13, 103 163, 164	D - 2 D - 88
B2	S0001	Space Debris Impact Structure Boundary	14, 104 164, 165	D - 8 D - 92
B3	A0138	/\\FRECOPA/\\/ Structure Boundary	15, 105, 273 165, 166	D - 14 D - 96
B4	A0054	Space Plasma High Voltage Drainage Structure Boundary	16, 106 166, 167	D - 20 D - 100
B5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	17, 107 167, 168	D - 26 D - 104
B6	S0001	Space Debris Impact Structure Boundary	18, 108 168, 169	D - 32 D - 108
B7	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	19, 109 169, 170	D - 38 D - 112
B8	A0056 A0147 S0001	High-Perf IR Multilayer Filters & Material Exposure of ERBE Components Space Debris Impact Structure Boundary	20, 110 170, 171	D - 44 D - 116
B9	A0134 S0010	Composites for Large Space Structures Spacecraft Coatings Structure Boundary	21, 111 171, 172	D - 50 D - 120
B10	S1005	Transverse Flat Heat Pipe Structure Boundary	22, 112 172, 173	D - 56 D - 124
B11	S0001	Space Debris Impact Structure Boundary	23, 113 173, 174	D - 62 D - 128
B12	A0201	Interplanetary Dust Structure Boundary	24, 114 163, 174	D - 68 D - 132
C1		---GRAPPLE---	25, 115, 274 163, 164, 221	D - 3 D - 88, 151
C2	A0015 A0187-M0006	Free Flyer Biostack Isotopic Micrometeoroid Measurement Space Environment Effects Structure Boundary	26, 116, 276 164, 165, 222	D - 9 D - 92, 151
C3	A0023	Multiple Foil Microabrasion Package	27, 117	D - 15

APPENDIX D
INDEX
END OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	CHART NUMBER
C3	A0034 A0114 A0201	Atomic Oxygen Stimulated Outgassing Atomic Oxygen / Solid Surfaces Interaction Interplanetary Dust Structure Boundary	165, 166, 223	D - 96, 151
C4	S0001	Space Debris Impact Structure Boundary	28, 118 166, 167, 224	D - 21 D - 100, 152
C5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	29, 119 167, 168, 225	D - 27 D - 104, 152
C6	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	30, 120 168, 169, 226	D - 33 D - 108, 152
C7	S0001	Space Debris Impact Structure Boundary	31, 121 169, 170, 227	D - 39 D - 112, 153
C8	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	32, 122 170, 171, 228	D - 45 D - 116, 153
C9	A0023 A0034 A0114 A0201	Multiple Foil Microabrasion Package Atomic Oxygen Stimulated Outgassing Atomic Oxygen / Solid Surfaces Interaction Interplanetary Dust Structure Boundary	33, 123 171, 172, 229	D - 51 D - 120, 153
C10		---GRAPPLE---	34, 124, 275 172, 173, 230	D - 57 D - 124, 154
C11	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	35, 125 173, 174, 231	D - 63 D - 128, 154
C12	S0109	Fiber Optic Data Transmission Structure Boundary	36, 126 163, 174, 232	D - 69 D - 132, 154
D1	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	37, 127 221, 240, 241	D - 4 D - 151, 89
D2	A0172 A0189 S0001	Effects of Solar Radiation on Glasses Quartz Crystal Oscillators Space Debris Impact Structure Boundary	38, 128, 277, 278 222, 241, 242	D - 10 D - 151, 93
D3	M0002- M0003	Trapped Proton Energy Spectrum Spacecraft Materials Structure Boundary	39, 129 223, 242, 243	D - 16 D - 151, 97
D4	M0003	Spacecraft Materials Structure Boundary	40, 130 224, 243, 244	D - 22 D - 152, 101
D5	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	41, 131 225, 244, 245	D - 28 D - 152, 105
D6	A0201 S0001 A0201	Interplanetary Dust Space Debris Impact Structure Boundary	42, 132, 279 226, 245, 246	D - 34 D - 152, 109
D7	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	43, 133 227, 246, 247	D - 40 D - 153, 113
D8	M0003	Spacecraft Materials Structure Boundary	44, 134 228, 247, 248	D - 46 D - 153, 117
D9	M0002- M0003	Trapped Proton Energy Spectrum Spacecraft Materials Structure Boundary	45, 135 229, 248, 249	D - 52 D - 153, 121
D10	A0054	Space Plasma High Voltage Drainage Structure Boundary	46, 136 230, 249, 250	D - 58 D - 154, 125
D11	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	47, 137 231, 250, 251	D - 64 D - 154, 129
D12	A0019 A0023 A0180	High Toughness G/E Composites Multiple Foil Microabrasion Package Polymer Matrix Composites Structure Boundary	48, 138, 280, 281 232, 240, 251	D - 70 D - 154, 133
E1	S0001	Space Debris Impact Structure Boundary	49, 139 240, 241	D - 5 D - 89

APPENDIX D
INDEX
END OF MISSION

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	CHART NUMBER
E2	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	50, 140 241, 242	D - 11 D - 93
E3	S1002	Coatings & Solar Cells from Germany Structure Boundary	51, 141 242, 243	D - 17 D - 97
E4	S0001	Space Debris Impact Structure Boundary	52, 142 243, 244	D - 23 D - 101
E5	A0044 A0135 S0050	Holographic Data Storage Crystals Pyroelectric Infrared Detectors Active Optical System Components Structure Boundary	53, 143 244, 245	D - 29 D - 105
E6	A0023 M0002- S1003 S1006	Multiple Foil Microabrasion Package Heavy Cosmic Ray Nuclei Ion-Beam-Textured Surfaces Balloon Materials Structure Boundary	54, 144 245, 246	D - 35 D - 109
E7	S0001	Space Debris Impact Structure Boundary	55, 145 246, 247	D - 41 D - 113
E8	A0187-	Isotopic Micrometeoroid Measurement Structure Boundary	56, 146 247, 248	D - 47 D - 117
E9	S0014	Advanced Photovoltaics Structure Boundary	57, 147 248, 249	D - 53 D - 121
E10	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	58, 148 249, 250	D - 59 D - 125
E11	S0001	Space Debris Impact Structure Boundary	59, 149 250, 251	D - 65 D - 129
E12	A0038	Interstellar Gas Experiment Structure Boundary	60, 150 240, 251	D - 71 D - 133
F1	S0001	Space Debris Impact Structure Boundary	61, 151 187, 188, 240, 241	D - 6 D - 90
F2	P0004 P0006	Seeds in Space Linear Energy Transfer Spectrum Structure Boundary	62, 152 188, 189, 241, 242	D - 12 D - 94
F3	S0001	Space Debris Impact Structure Boundary	63, 153 189, 190, 242, 243	D - 18 D - 98
F4	A0178	Hi-Res Study of Ultra Heavy Cosmic Rays Structure Boundary	64, 154 190, 191, 243, 244	D - 24 D - 102
F5	S0001	Space Debris Impact Structure Boundary	65, 155 191, 192, 244, 245	D - 30 D - 106
F6	A0038	Interstellar Gas Experiment Structure Boundary	66, 156 192, 193, 245, 246	D - 36 D - 110
F7	S0001	Space Debris Impact Structure Boundary	67, 157 193, 194, 246, 247	D - 42 D - 114
F8	M0004	Fiber Optics Systems Structure Boundary	68, 158 194, 195, 247, 248	D - 48 D - 118
F9	A0076	Cascade Variable Conductance Heat Pipe Structure Boundary	69, 159 195, 196, 248, 249	D - 54 D - 122
F10	S0001	Space Debris Impact Structure Boundary	70, 160 196, 197, 249, 250	D - 60 D - 126
F11	S0001	Space Debris Impact Structure Boundary	71, 161 197, 198, 250, 251	D - 66 D - 130
F12	S1001	Low Temperature Heat Pipe (HEPP) Structure Boundary	72, 162 187, 198, 240, 251	D - 72 D - 134
G2	A0015	Free Flyer Biostack Structure Boundary	81, 252 200	D - 81 D - 143
G4	S0001	Space Debris Impact Structure Boundary	75, 255 201	D - 82 D - 144
G6	A0139a	Growth of Crystals from Solutions Structure Boundary	74, 254 199, 201, 202	D - 83 D - 145

APPENDIX D
INDEX
END OF MISSION

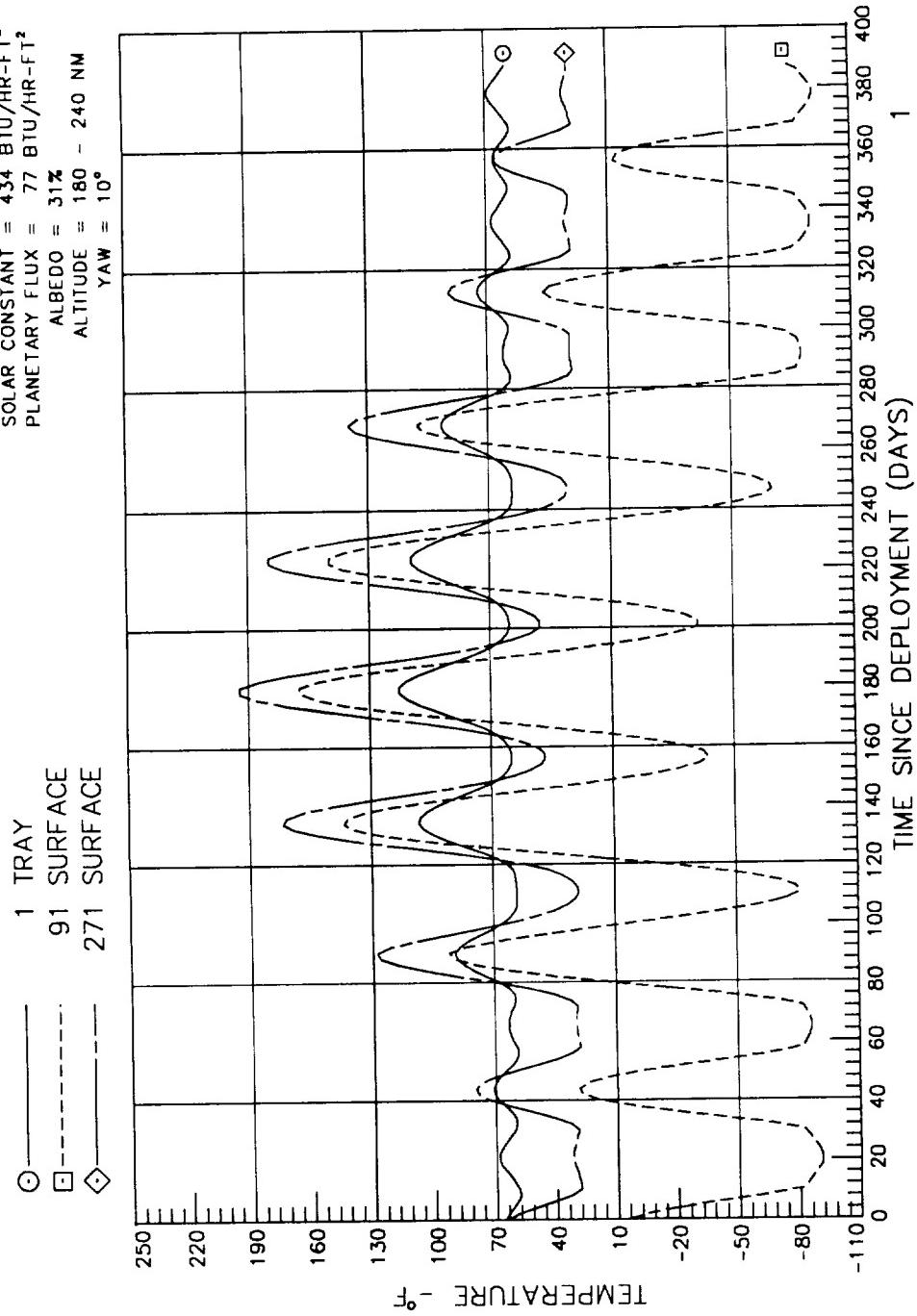
LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	CHART NUMBER
G8	S0001	Space Debris Impact Structure Boundary	73, 253 202	D - 84 D - 146
G10	A0201	Interplanetary Dust Structure Boundary	79, 259 203	D - 85 D - 147
G12	A0056	High-Perf IR Multilayer Filters & Material	80, 260, 283, 284	D - 86
	A0147	Exposure of ERBE Components		
	A0172	Effects of Solar Radiation on Glasses		
	M0002-	Trapped Proton Energy Spectrum Structure Boundary	199, 200, 203	
H1	S1001	Low Temperature Heat Pipe (HEPP) Structure Boundary	90, 261 209	D - 73 D - 135
H3	M0001	Heavy Ions in Space Structure Boundary	88, 268 208, 209, 210	D - 74 D - 136
H5	S0001	Space Debris Impact Structure Boundary	85, 265 210	D - 75 D - 137
H6	A0038	Interstellar Gas Experiment Structure Boundary	84, 264 208, 210, 211	D - 76 D - 138
H7	A0133	Radar Phased-Array Antenna Structure Boundary	83, 263, 282 211	D - 77 D - 139
H9	A0038	Interstellar Gas Experiment Structure Boundary	86, 266 208, 211, 212	D - 78 D - 140
H11	A0023	Multiple Foil Microabrasion Package	82, 262	D - 79
	A0201	Interplanetary Dust Structure Boundary	212	D - 141
H12	M0001	Heavy Ions in Space Structure Boundary	89, 269 208, 209, 212	D - 80 D - 142
CENTER STRUCTURE INTERIOR			217, 218, 219, 220	D - 149
DUMMY RADIATION NODE & CENTER AVERAGE (217-			233, 217-220	D - 150
CENTER RING ROWS 1 - 3			221, 222, 223	D - 151
CENTER RING ROWS 4 - 6			224, 225, 226	D - 152
CENTER RING ROWS 7 - 9			227, 228, 229	D - 153
CENTER RING ROWS 1- 12			230, 231, 232	D - 154
INITIATE SYSTEM & P0003 ELECTRONICS			237	D - 155
EARTH END THERMAL PANELS			204, 205, 206, 207	D - 156
SPACE END THERMAL PANELS			213, 214, 215, 216	D - 157
EARTH END THERMAL PANEL SIDE ROWS 2 - 4			295, 296, 297	D - 158
EARTH END THERMAL PANEL SIDE ROWS 5 - 7			298, 299, 300	D - 159
EARTH END THERMAL PANEL SIDE ROWS 8 - 10			301, 302, 303	D - 160
EARTH END THERMAL PANEL SIDE ROWS 1,11,12			294, 304, 305	D - 161
SPACE END THERMAL PANEL SIDE ROWS 2 - 4			307, 308, 309	D - 162
SPACE END THERMAL PANEL SIDE ROWS 5 - 7			310, 311, 312	D - 163
SPACE END THERMAL PANEL SIDE ROWS 8 - 10			313, 314, 315	D - 164
SPACE END THERMAL PANEL SIDE ROWS 1,11,12			306, 316, 317	D - 165
EARTH DUMMY COVER PLATES			256, 257, 258	D - 166
SPACE DUMMY COVER PLATES			267	D - 167
MAGNETIC DAMPER & SHROUD			234, 235	D - 168
AO139-A BATTERY CLUSTER			236	D - 169
MAIN SCUFF PLATES			285, 286	D - 170
MAIN TRUNNION PINS			238, 239	D - 171
END SCUFF PLATES			289, 292	D - 172
END TRUNNION PINS			290, 293	D - 173
END SUPPORT BEAM			287, 288, 291	D - 174
KELL PIN			270	D - 175
AVERAGE FOR TRAYS 1- 72			1 - 72	D - 176
THERMAL COUPLE NODE AT EARTH END & LONGER			326, 327	D - 177
INTERIOR STRUTS			318, 319	D - 178

**APPENDIX D
INDEX
END OF MISSION**

LOC	EXP	EXPERIMENT TITLE / DESCRIPTION	NODE	CHART NUMBER
		INTERIOR STRUTS	320,321	D - 179
		INTERIOR STRUTS	322,323	D - 180
		INTERIOR STRUTS	324,325	D - 181

This page intentionally left blank

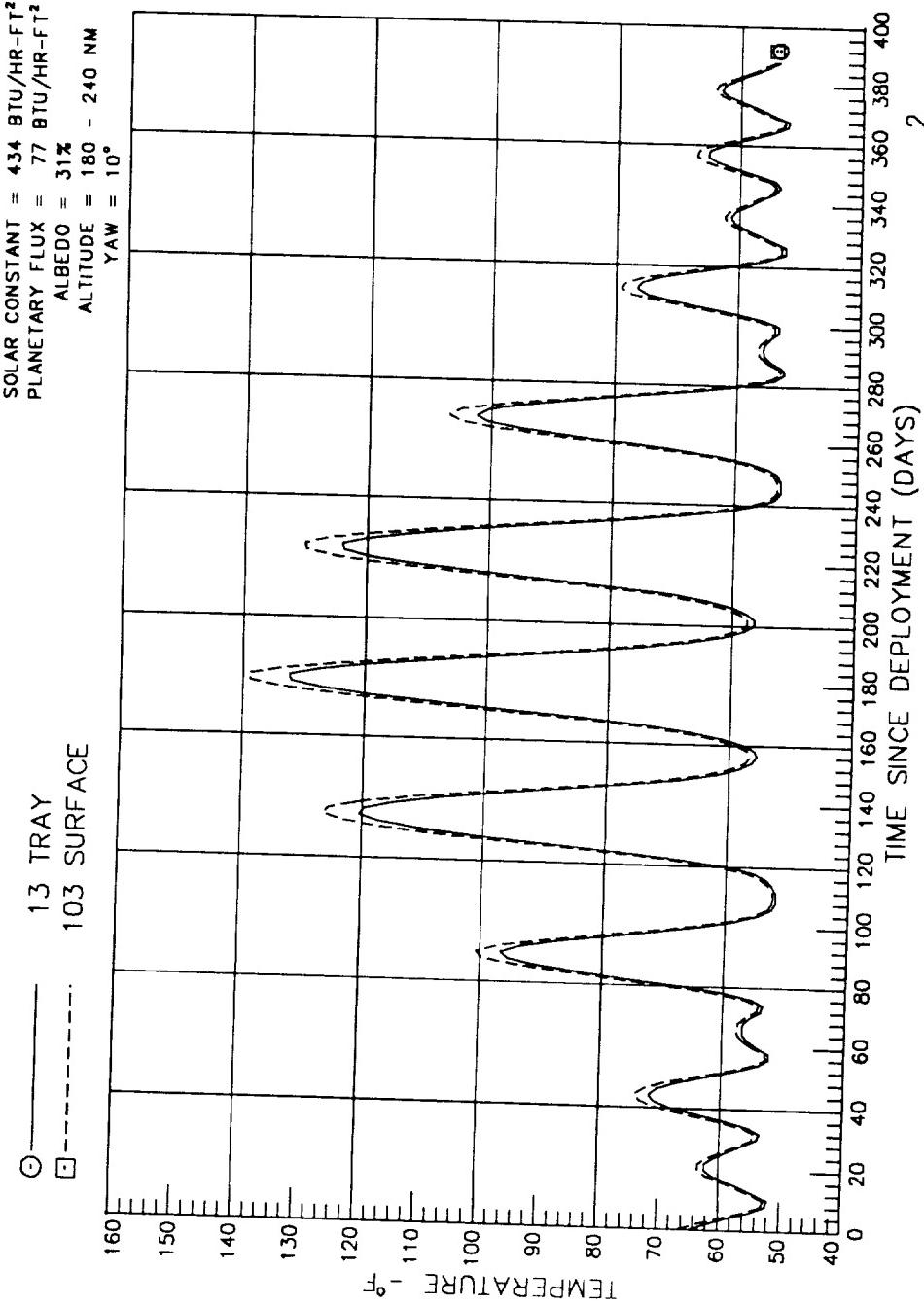
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A1



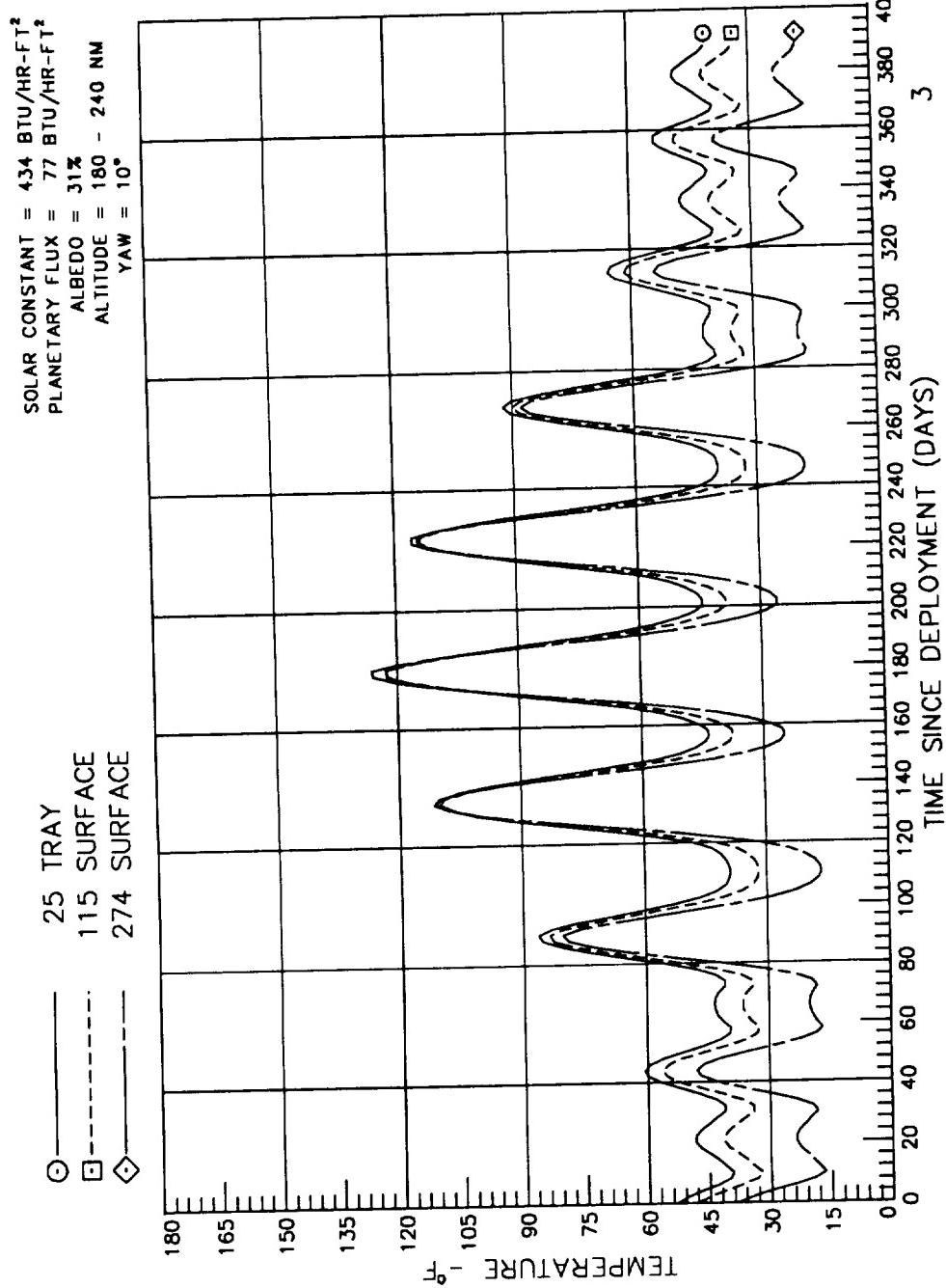
D - 1

PRECEDING PAGE BLANK NOT FILMED

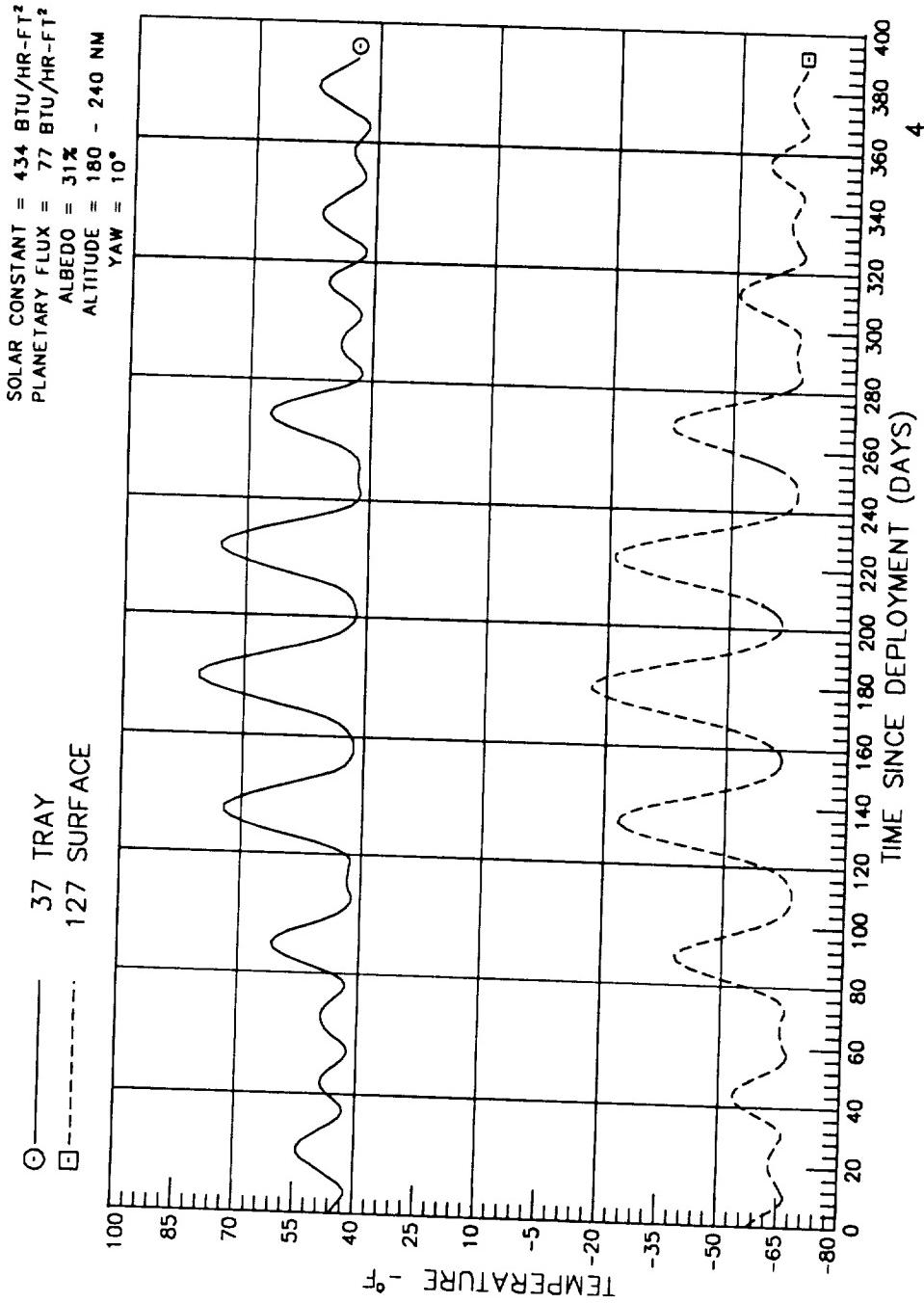
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B1



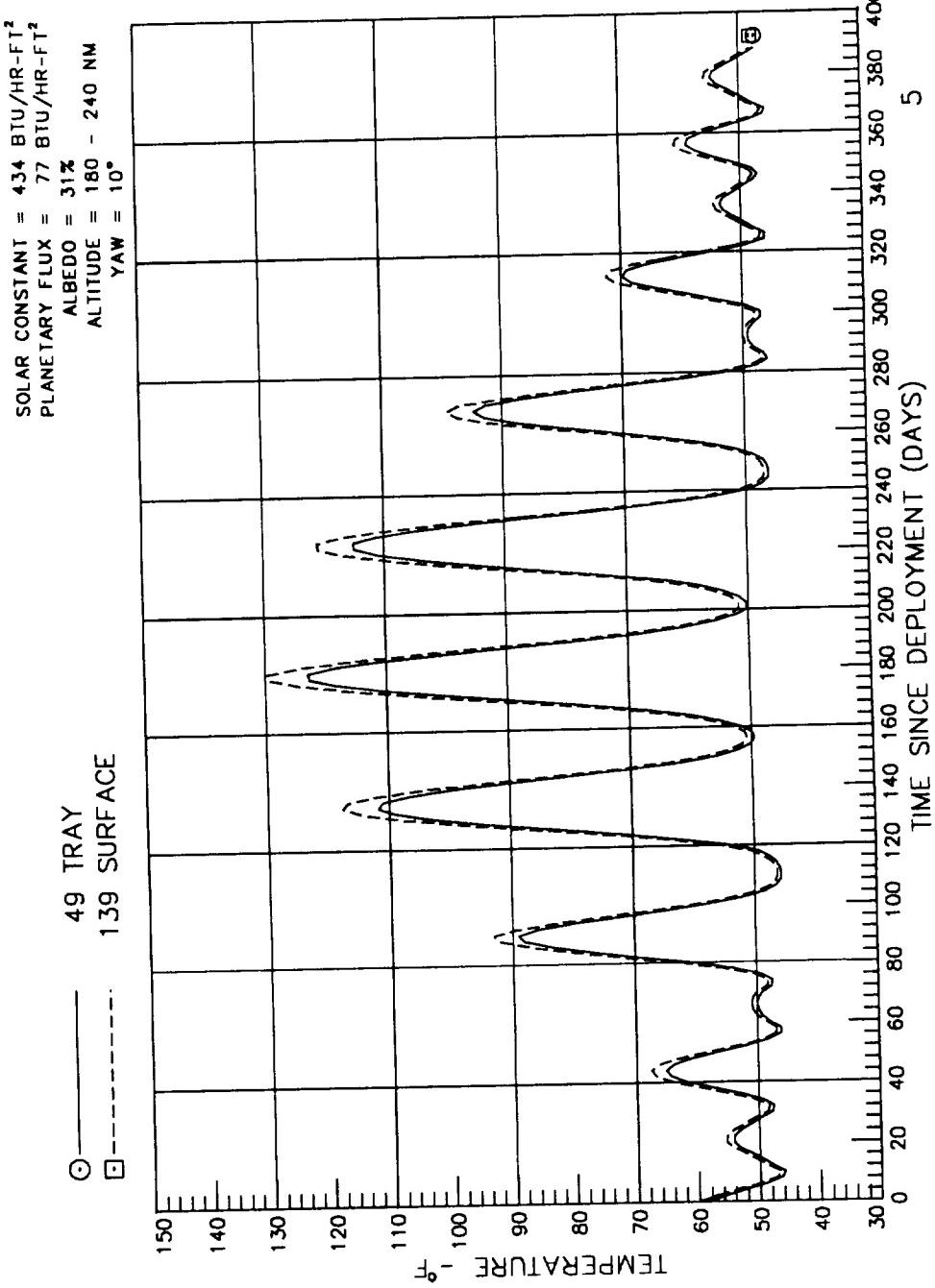
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C1



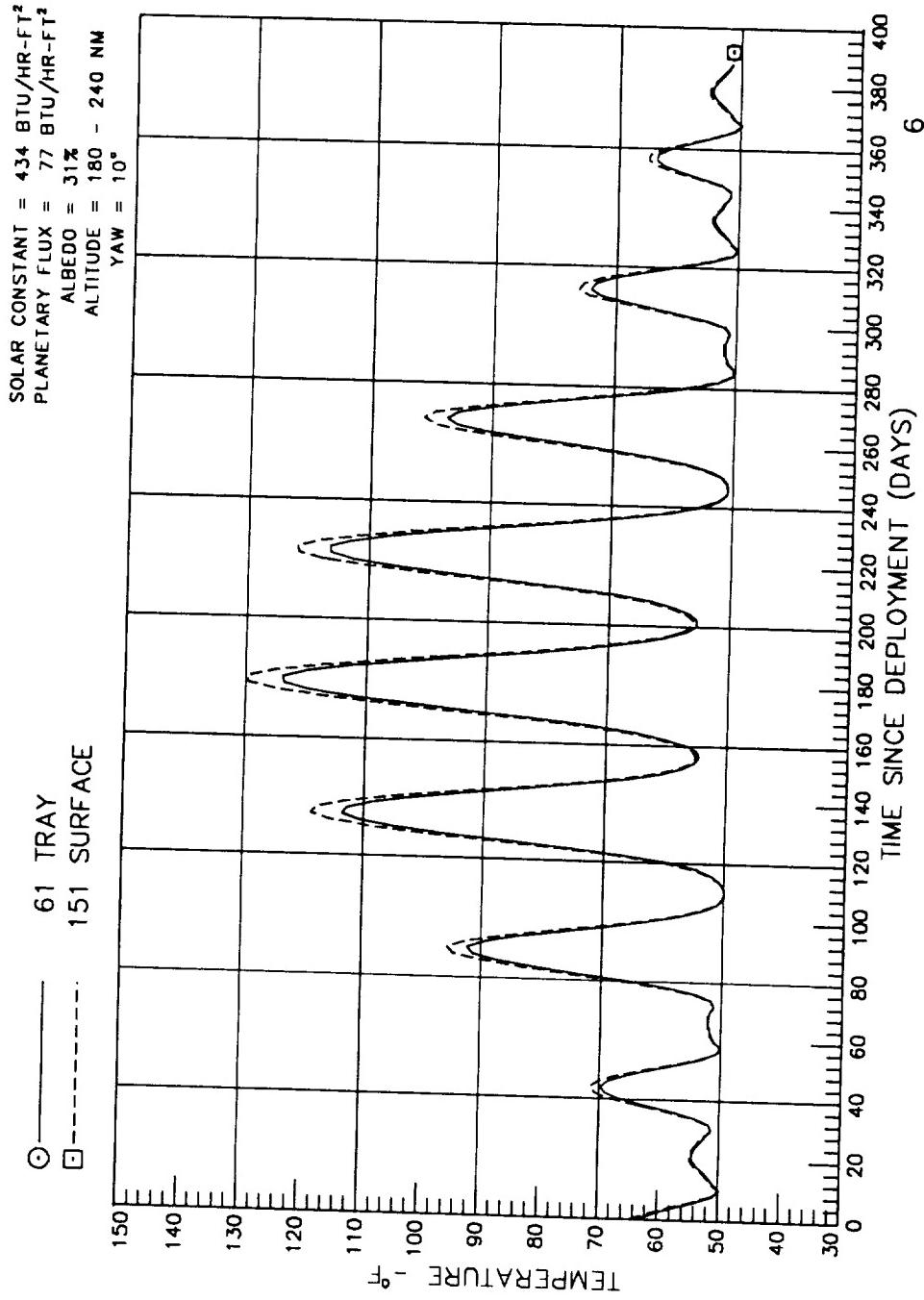
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D1



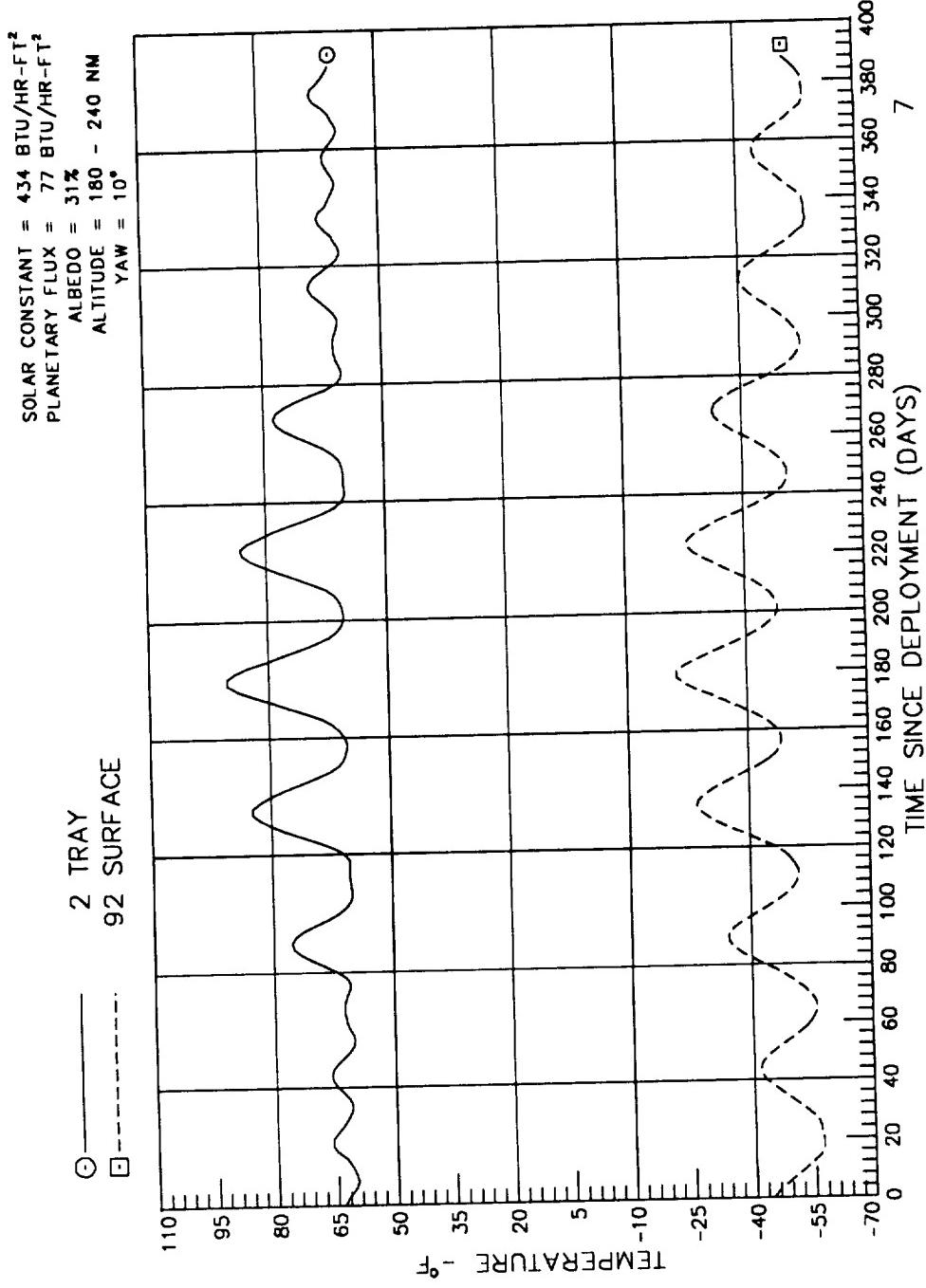
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E1



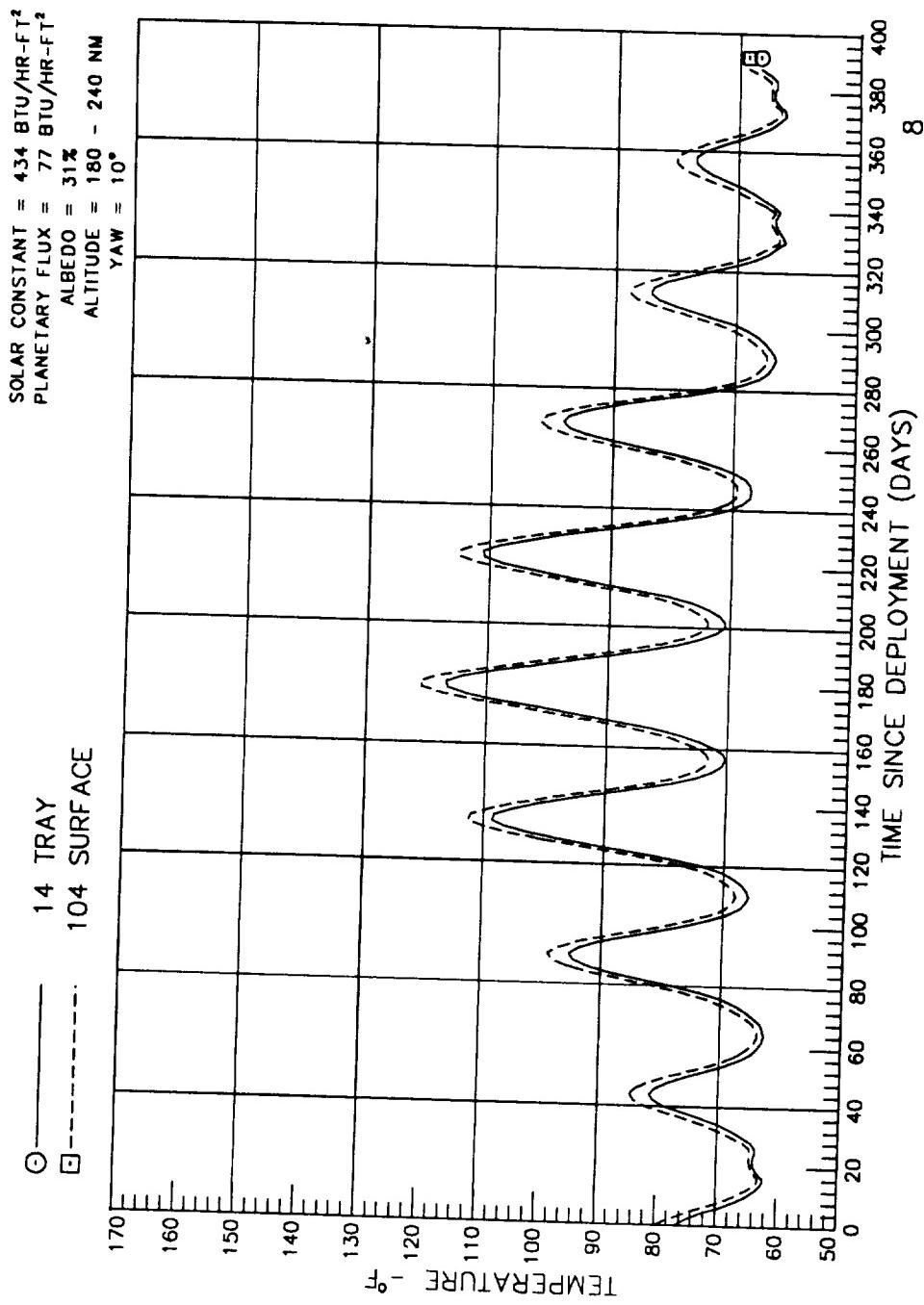
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F1



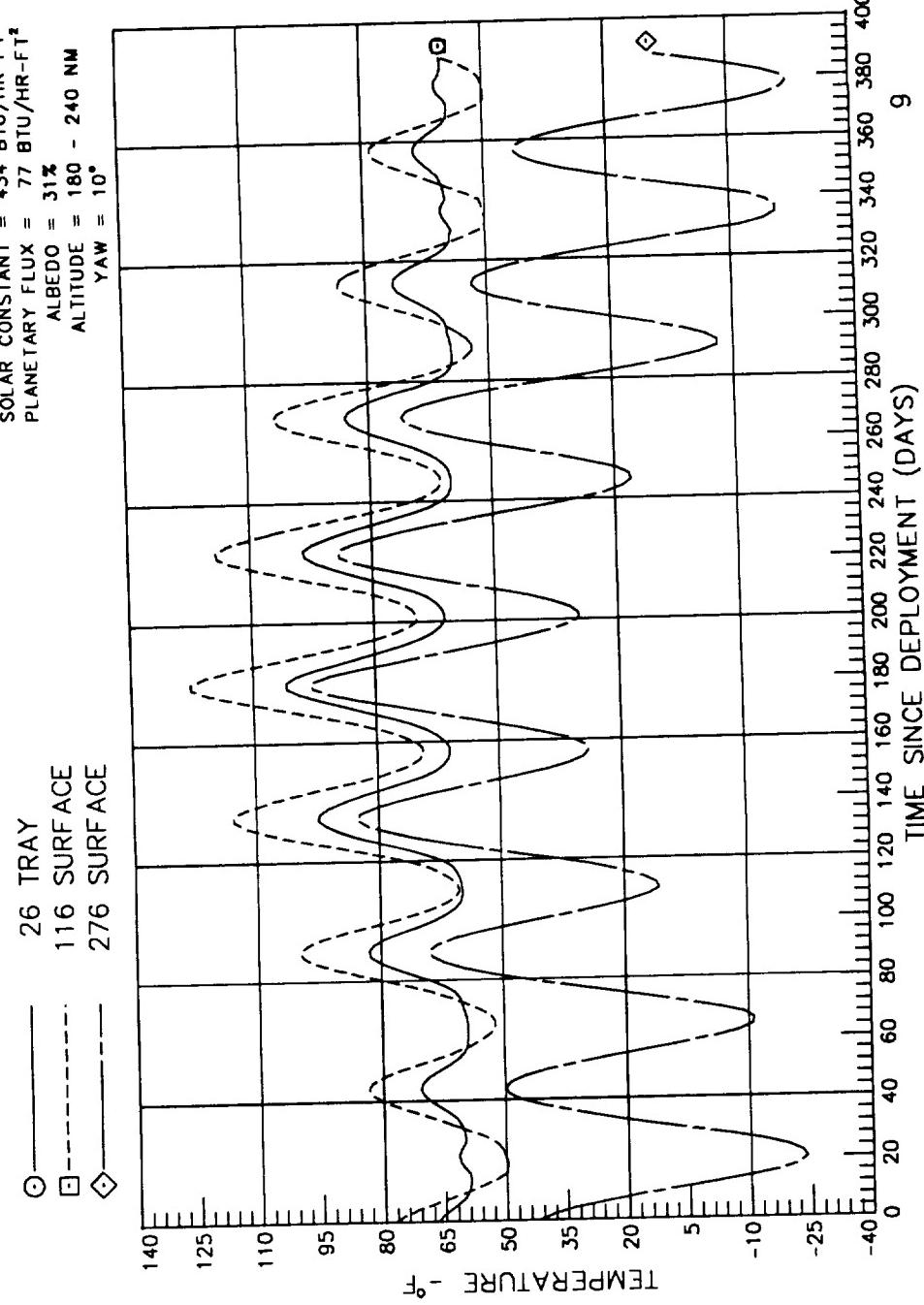
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A2



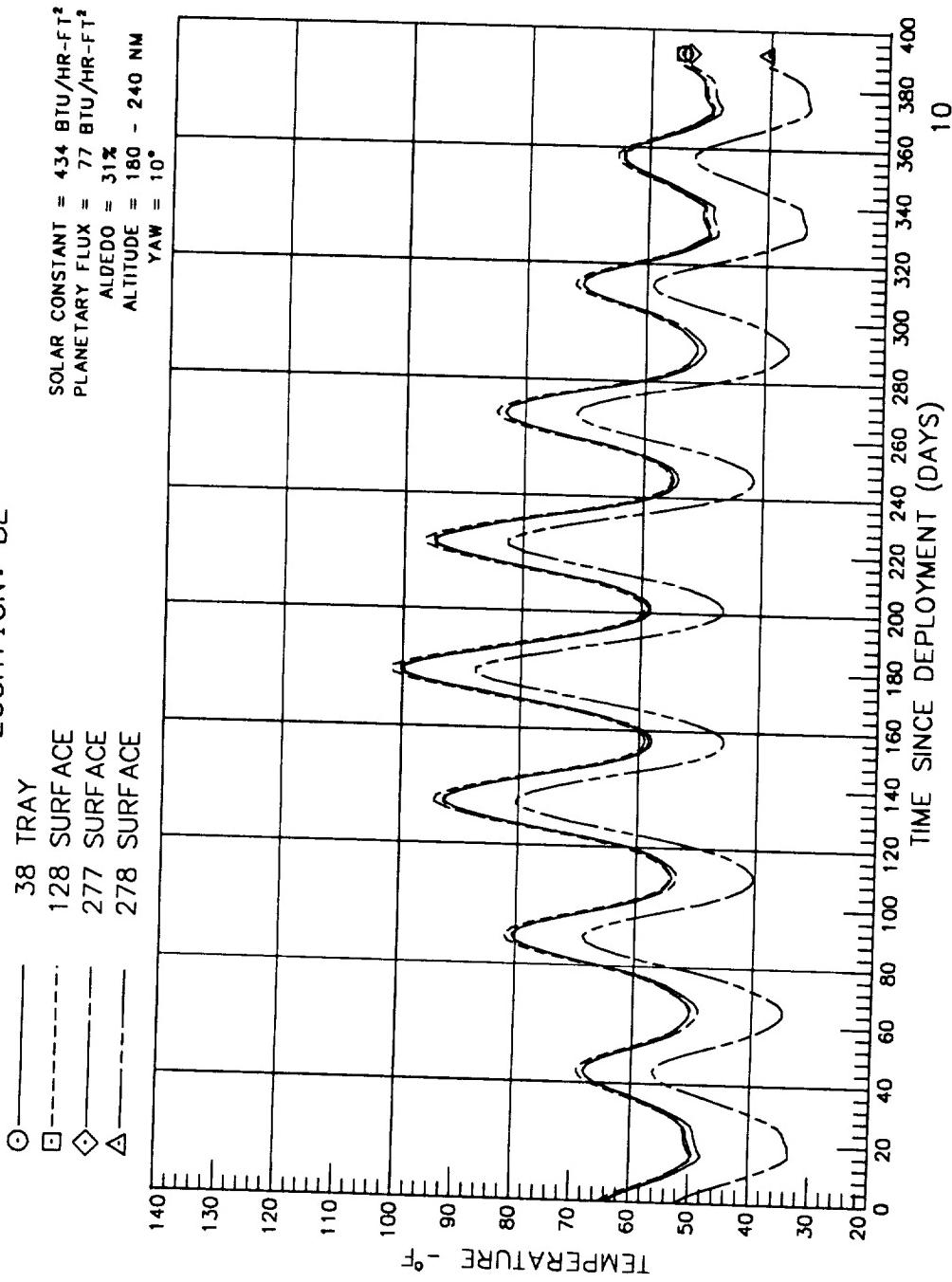
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B2



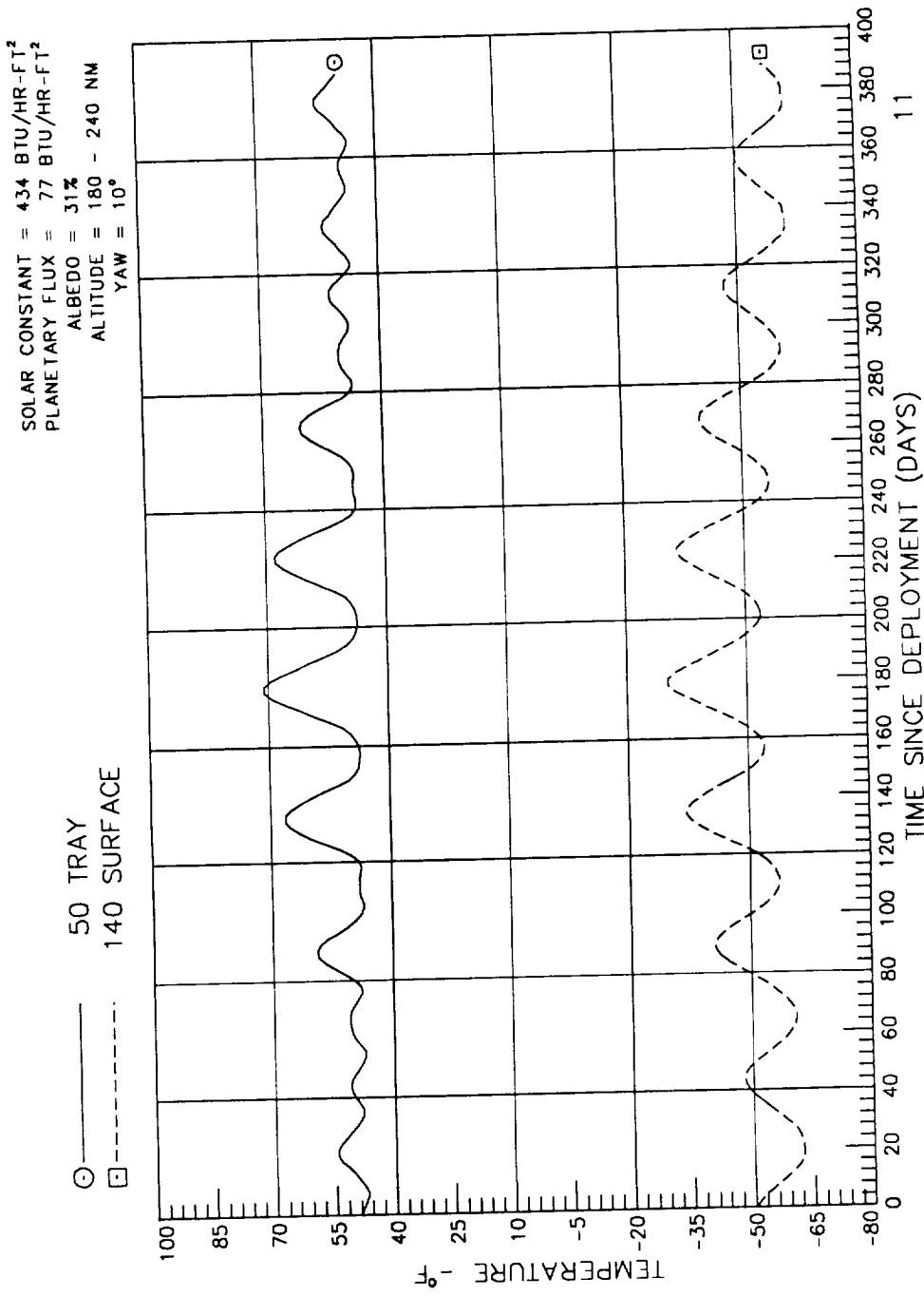
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C2



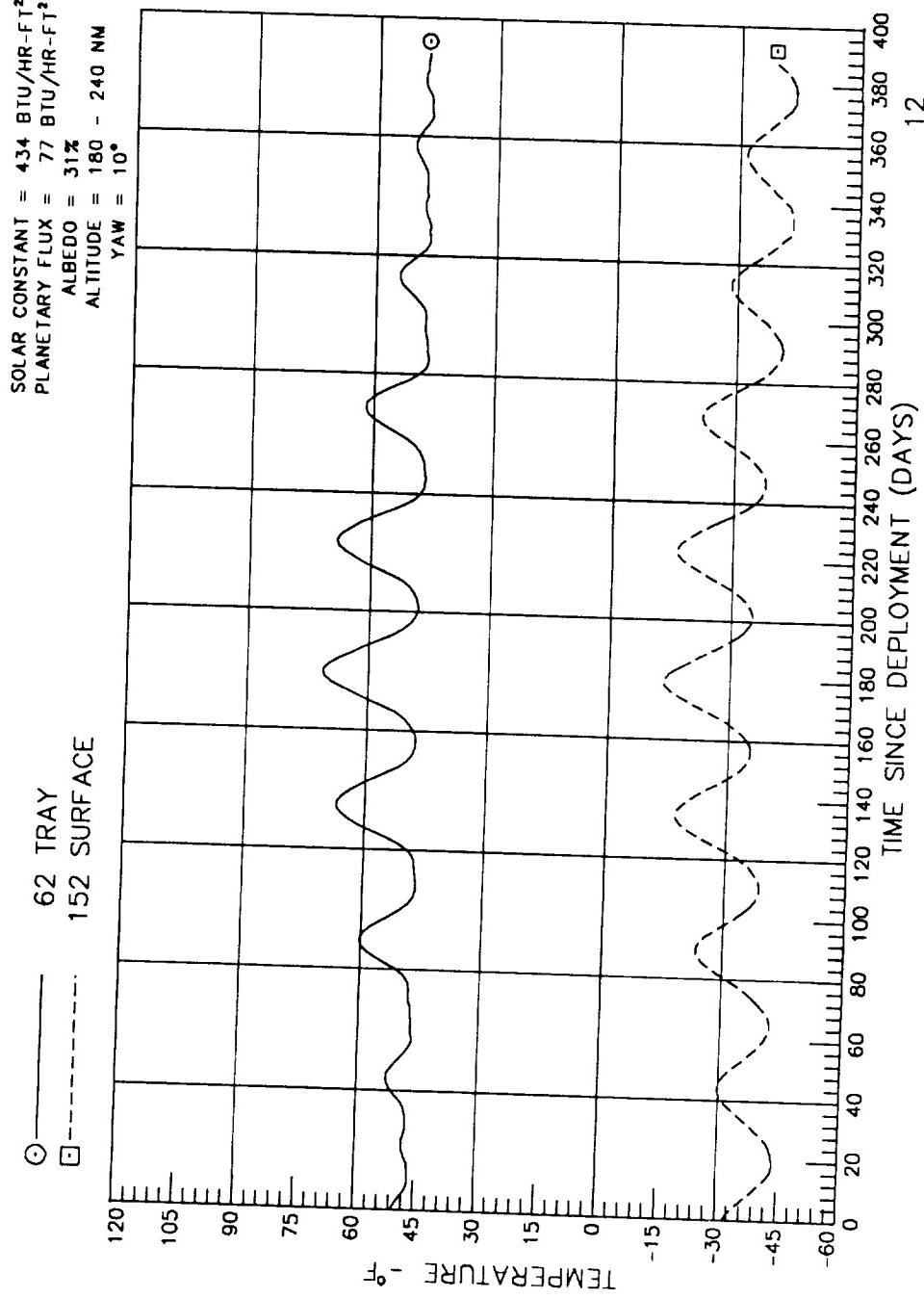
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D2



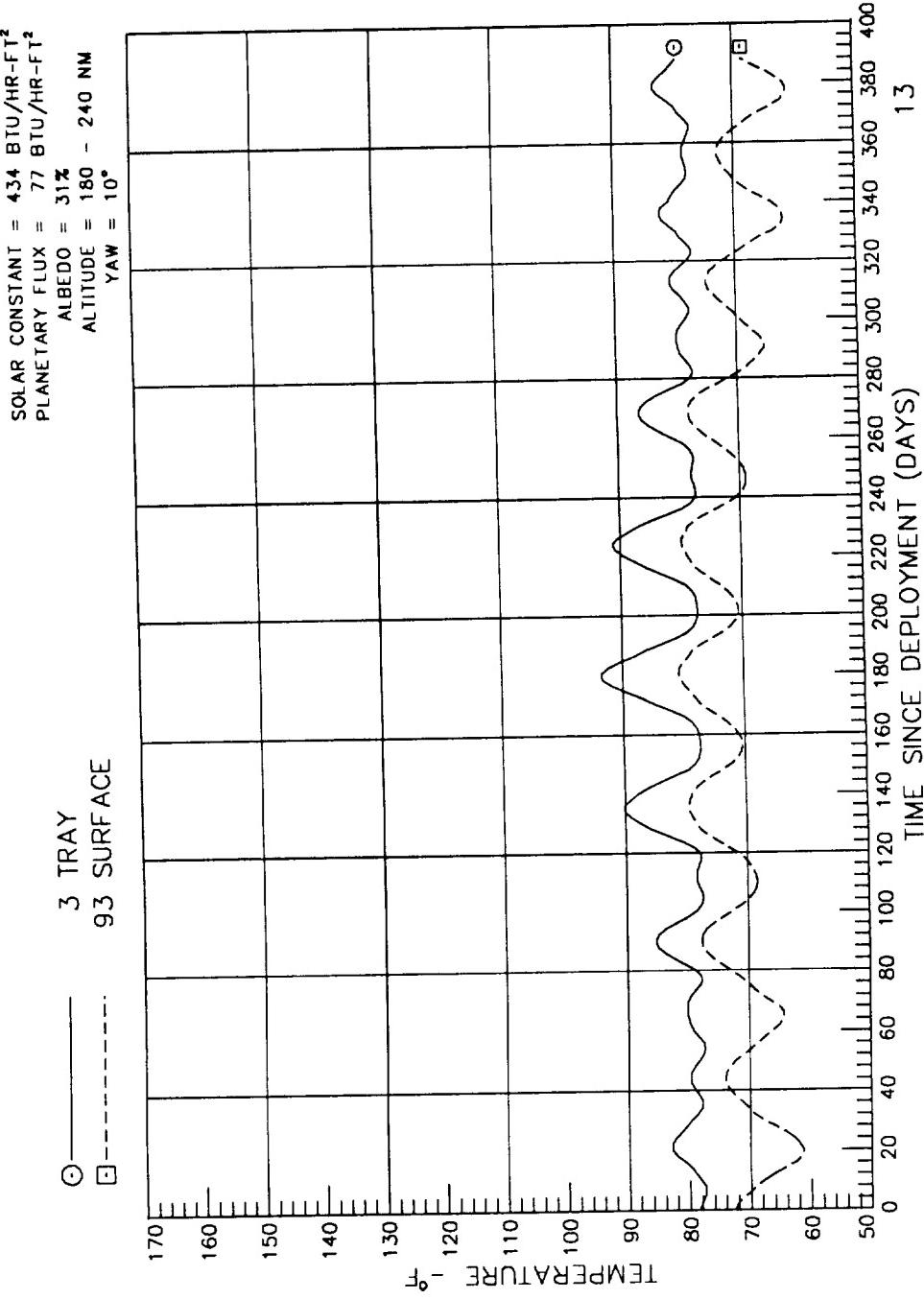
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E2



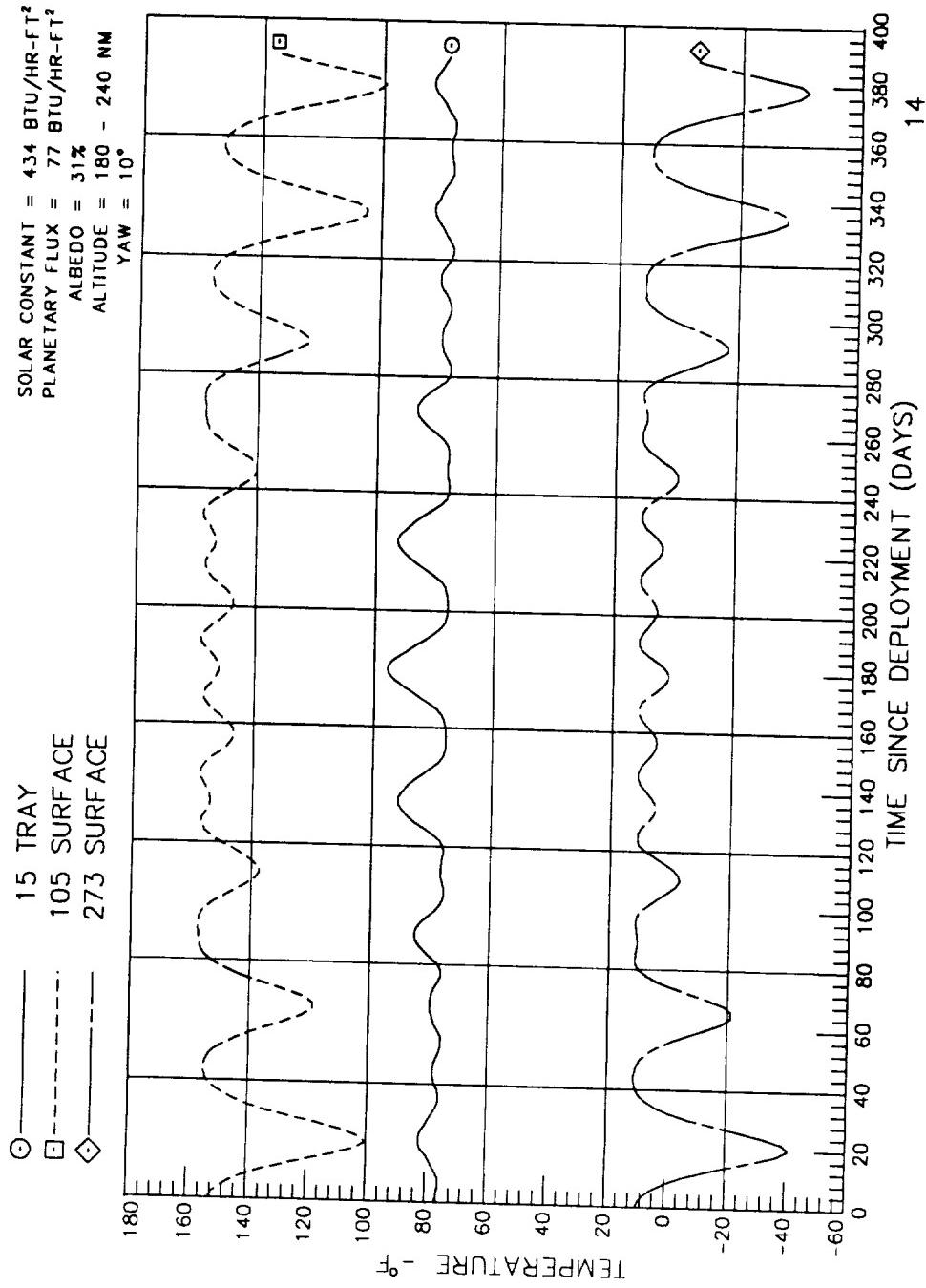
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F2



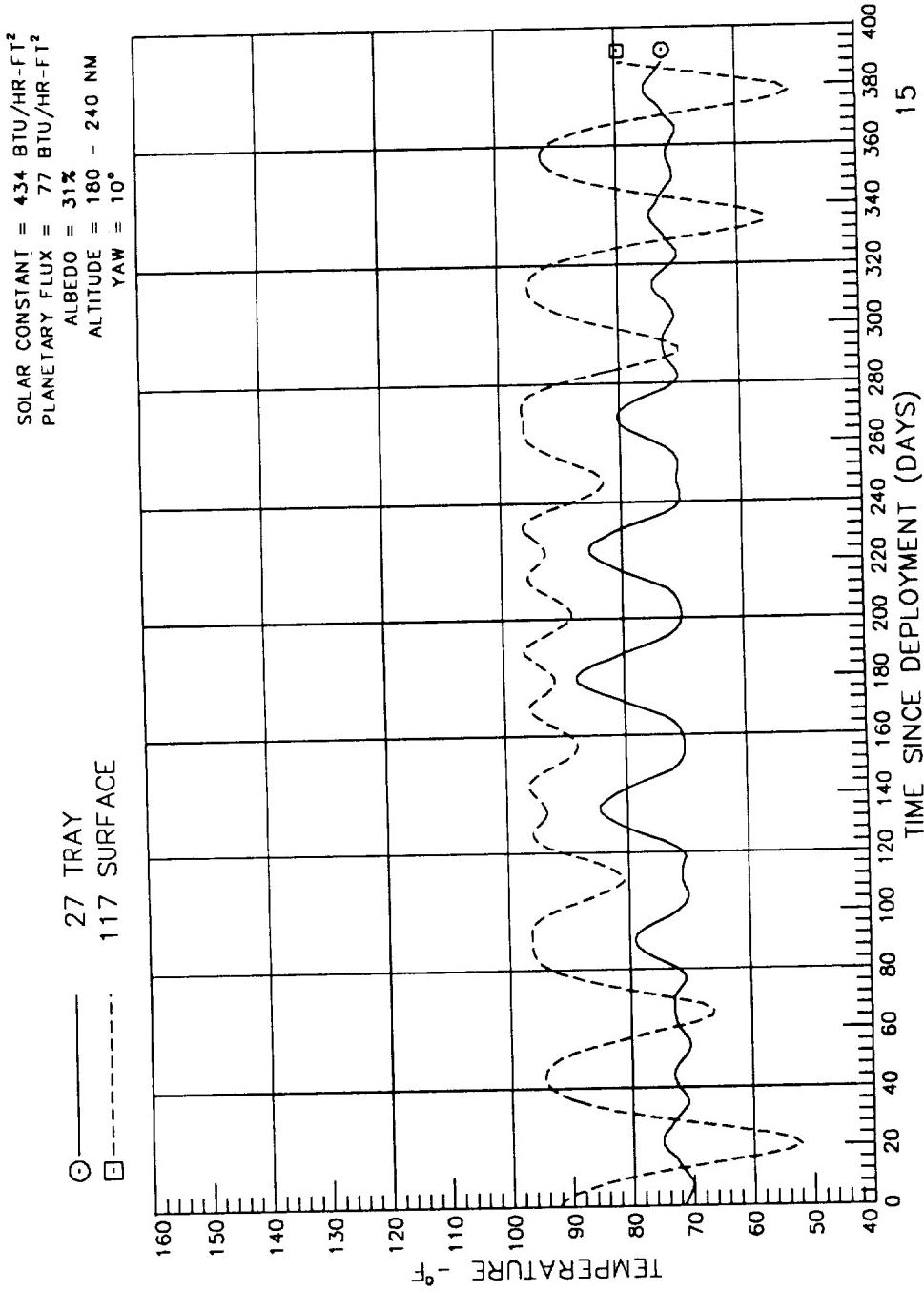
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A3



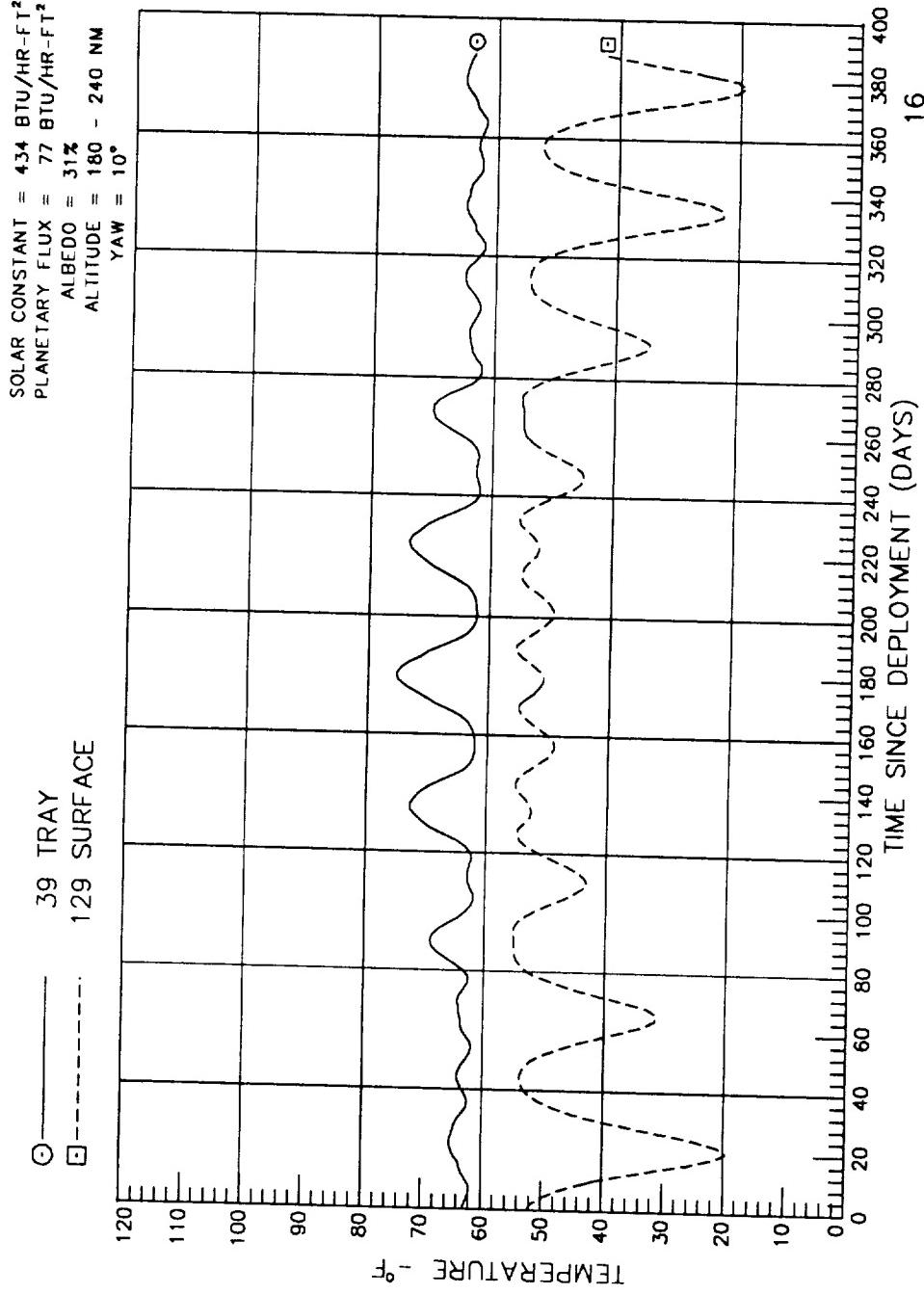
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C3



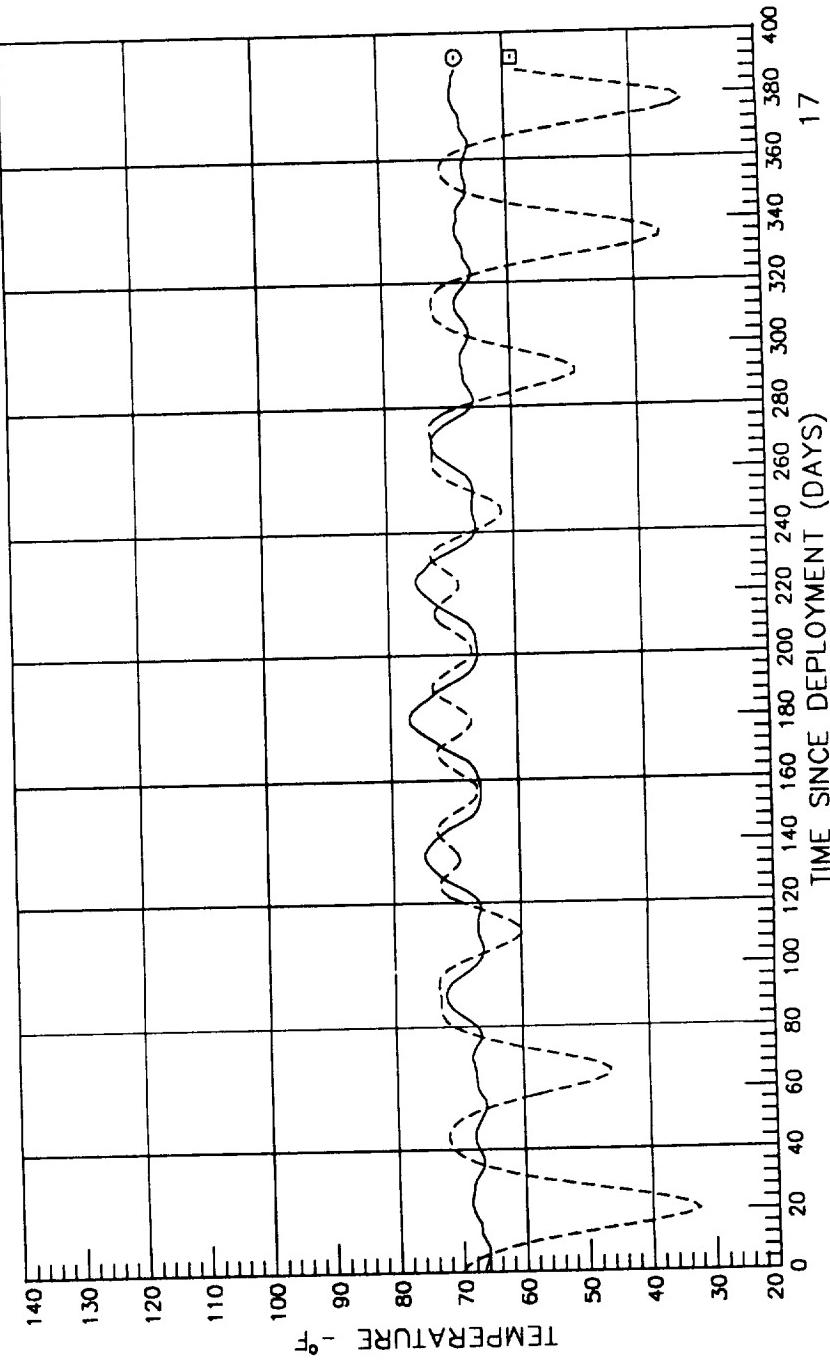
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D3



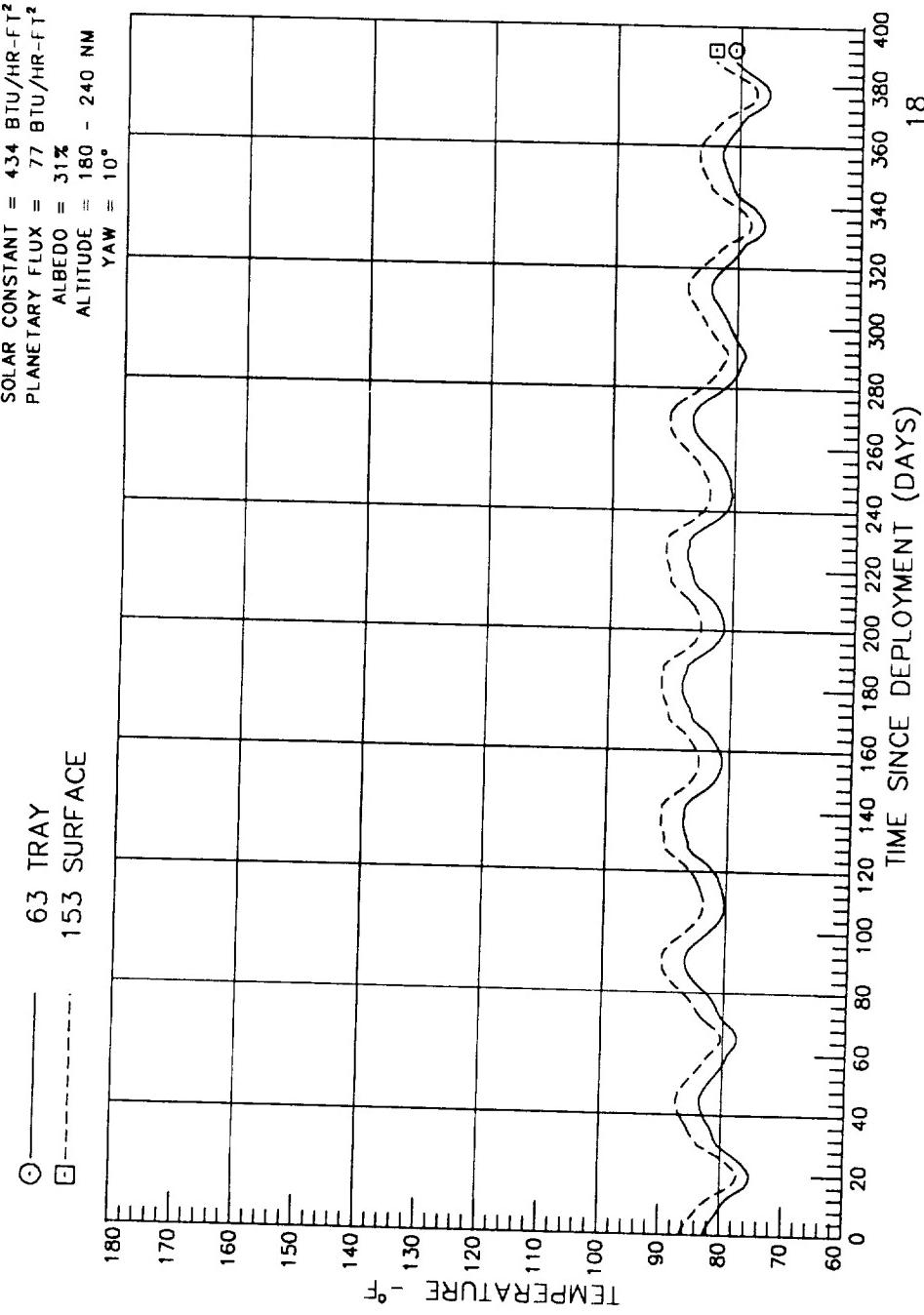
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E3

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

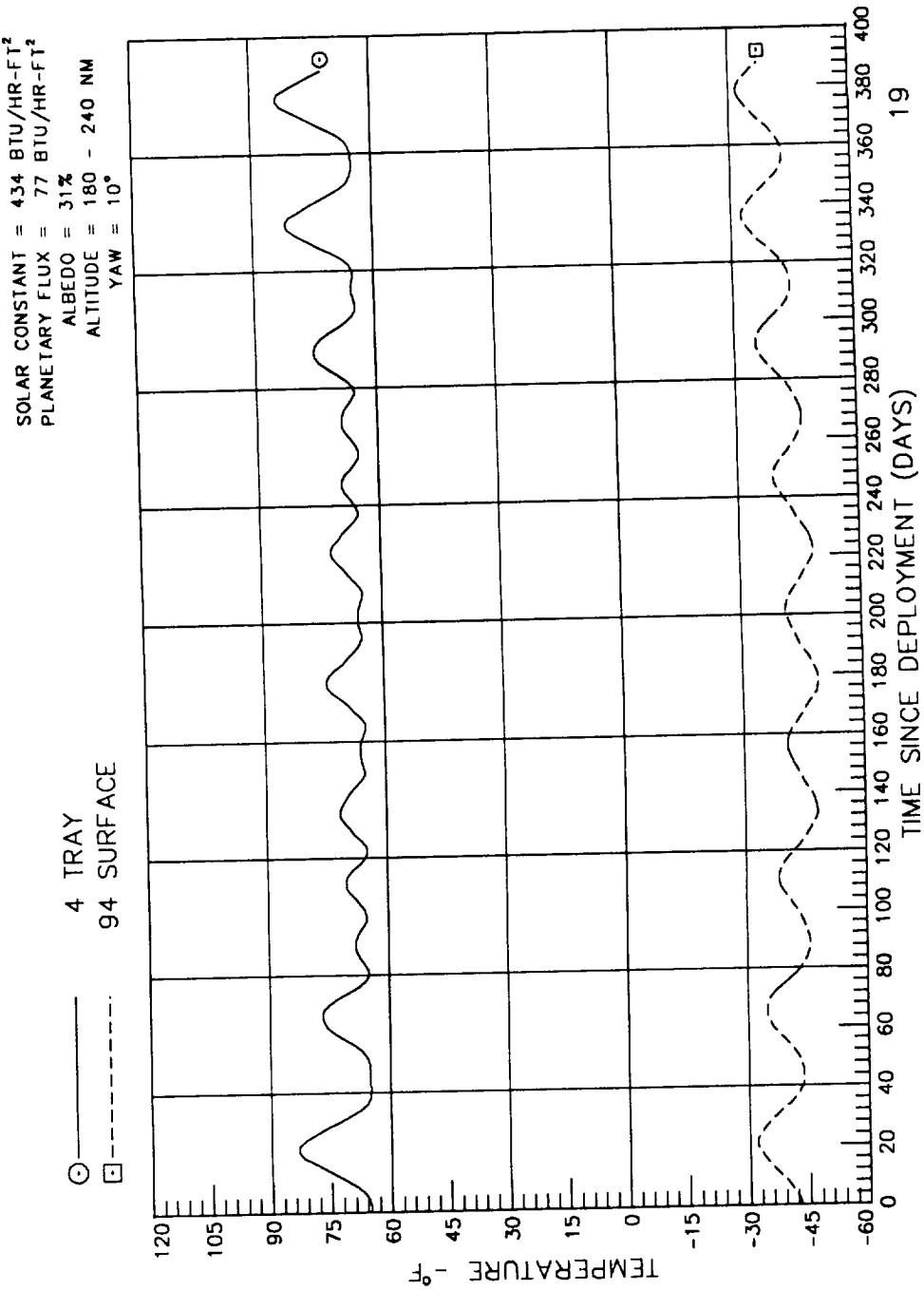
○ ——— 51 TRAY
 □ - - - 141 SURFACE



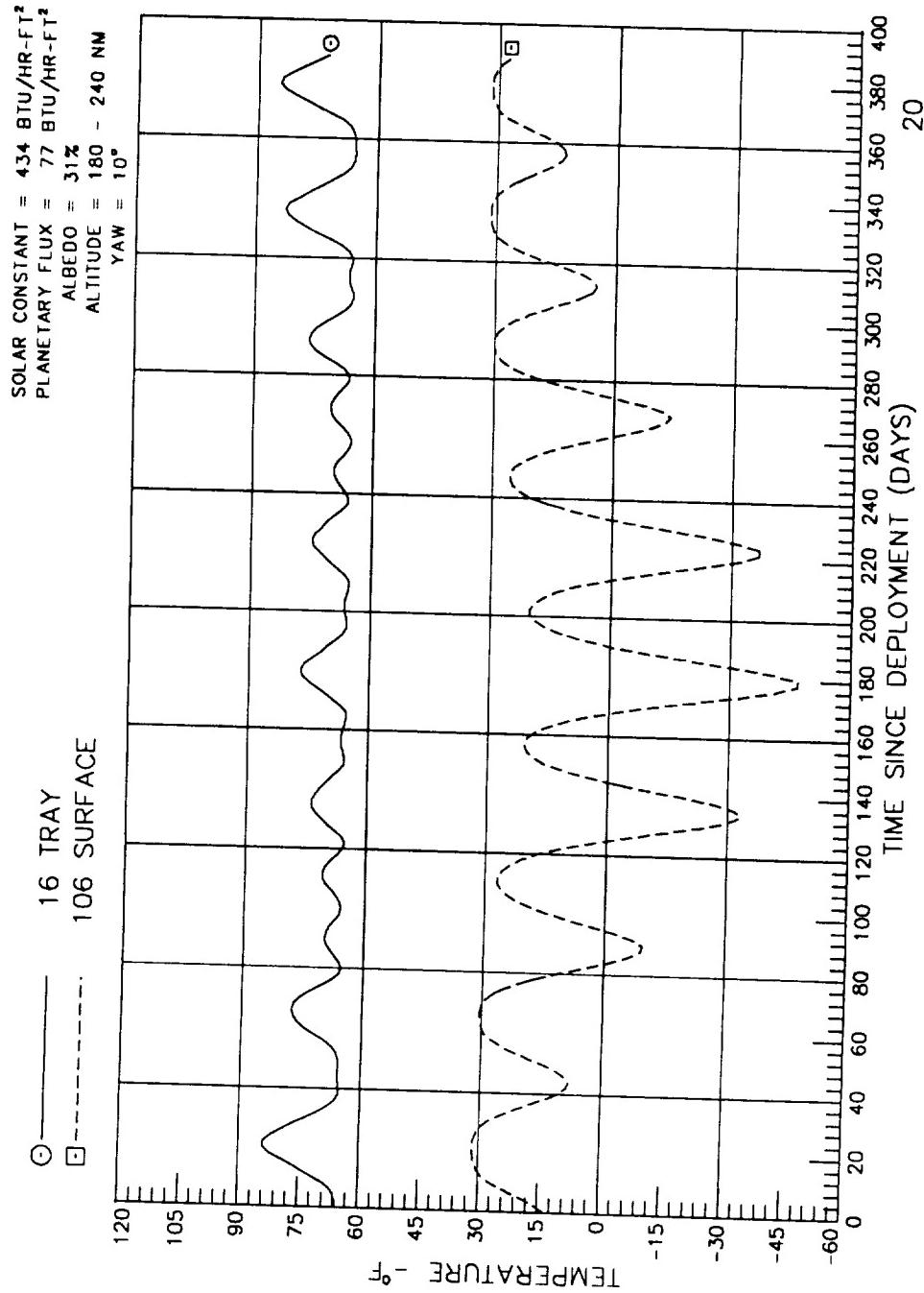
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F3



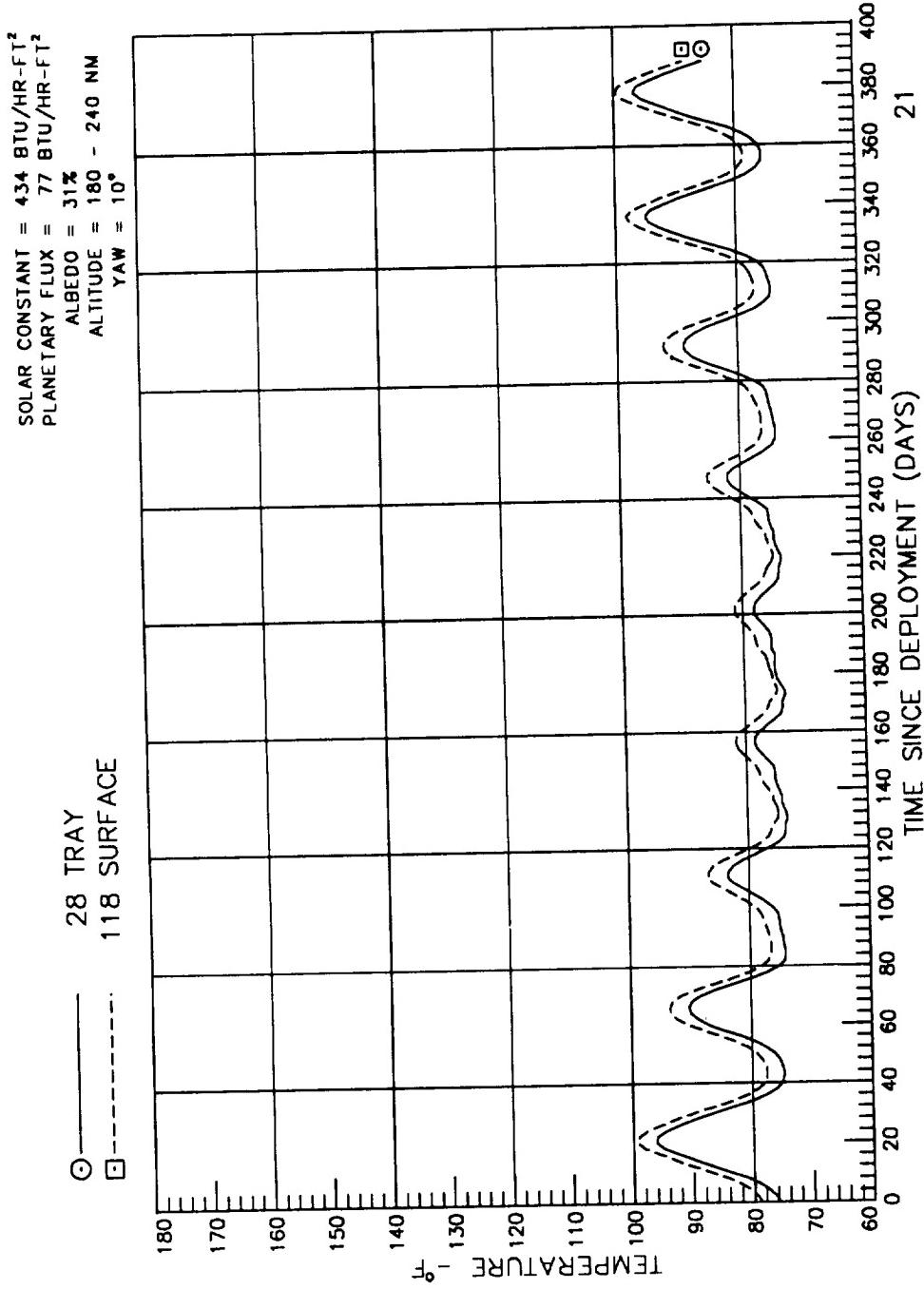
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A4



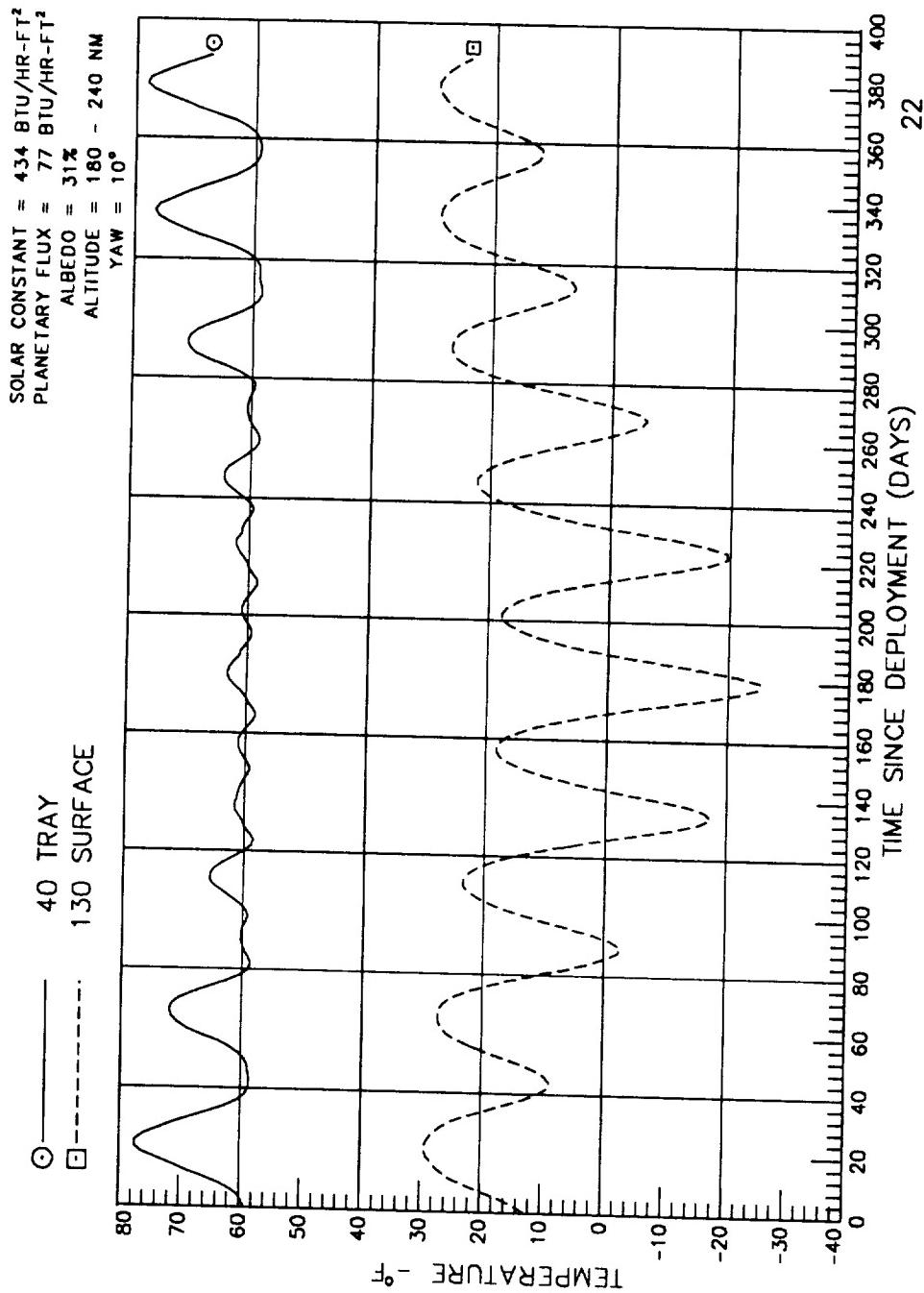
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B4



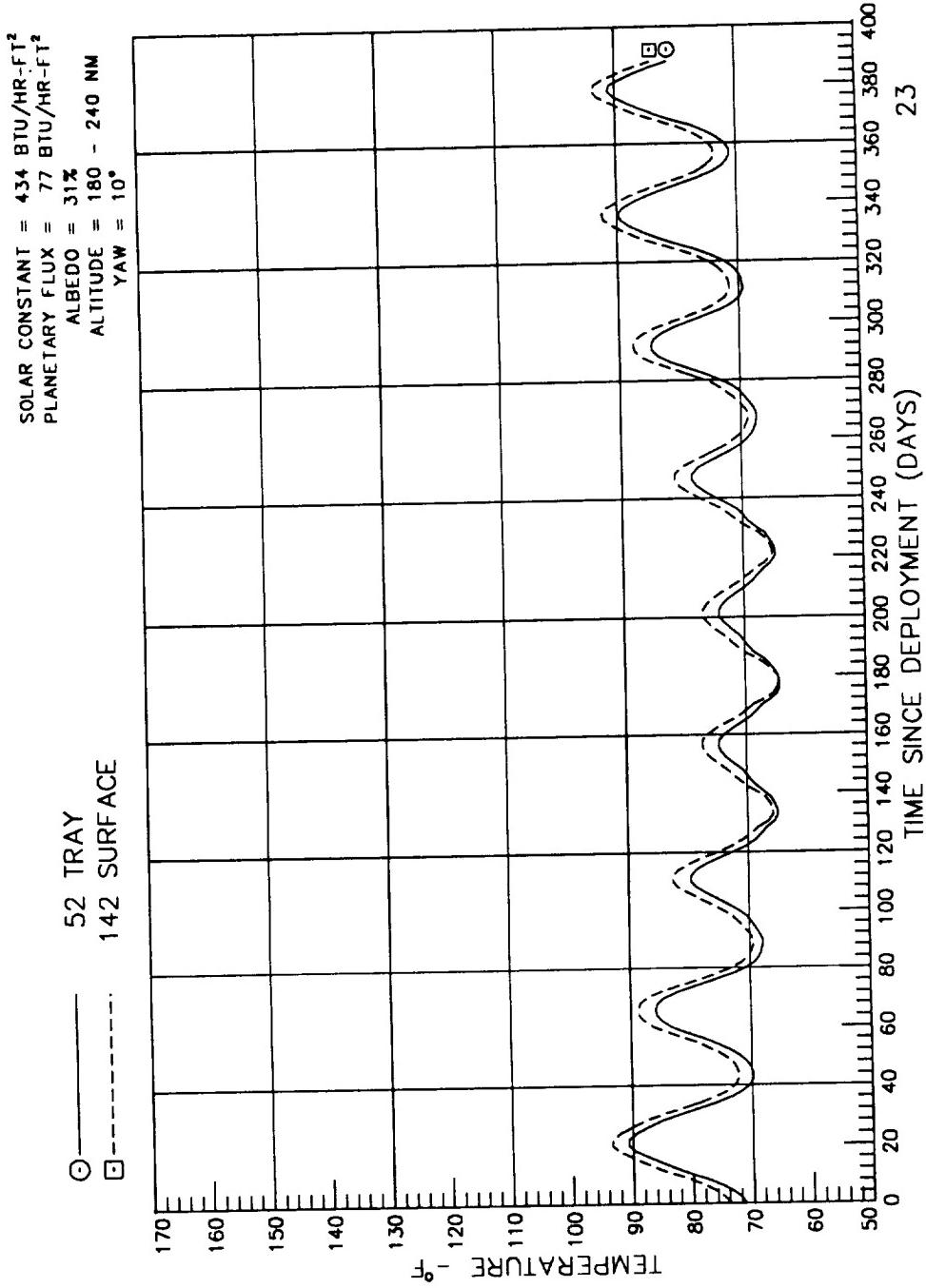
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C4



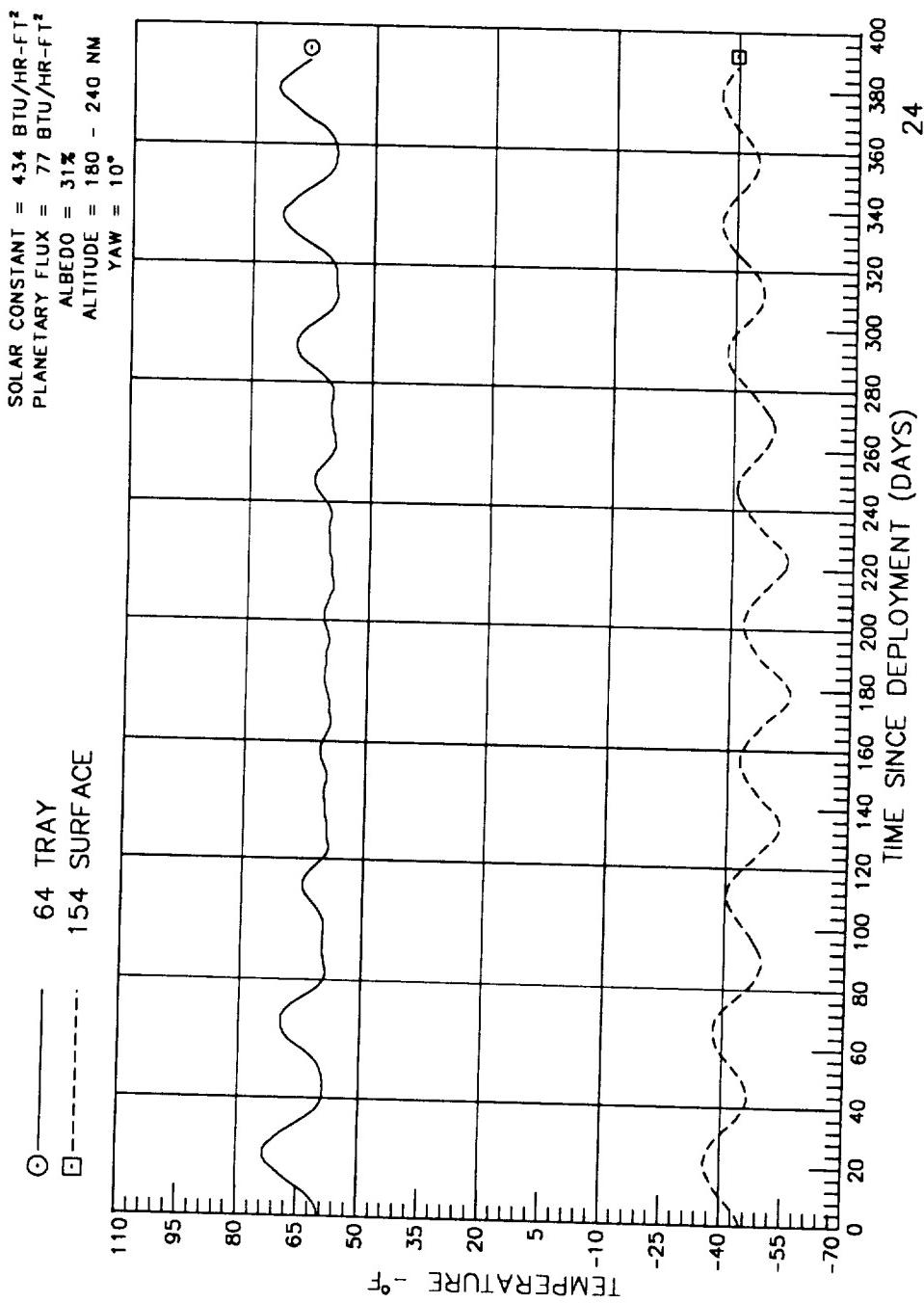
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D4



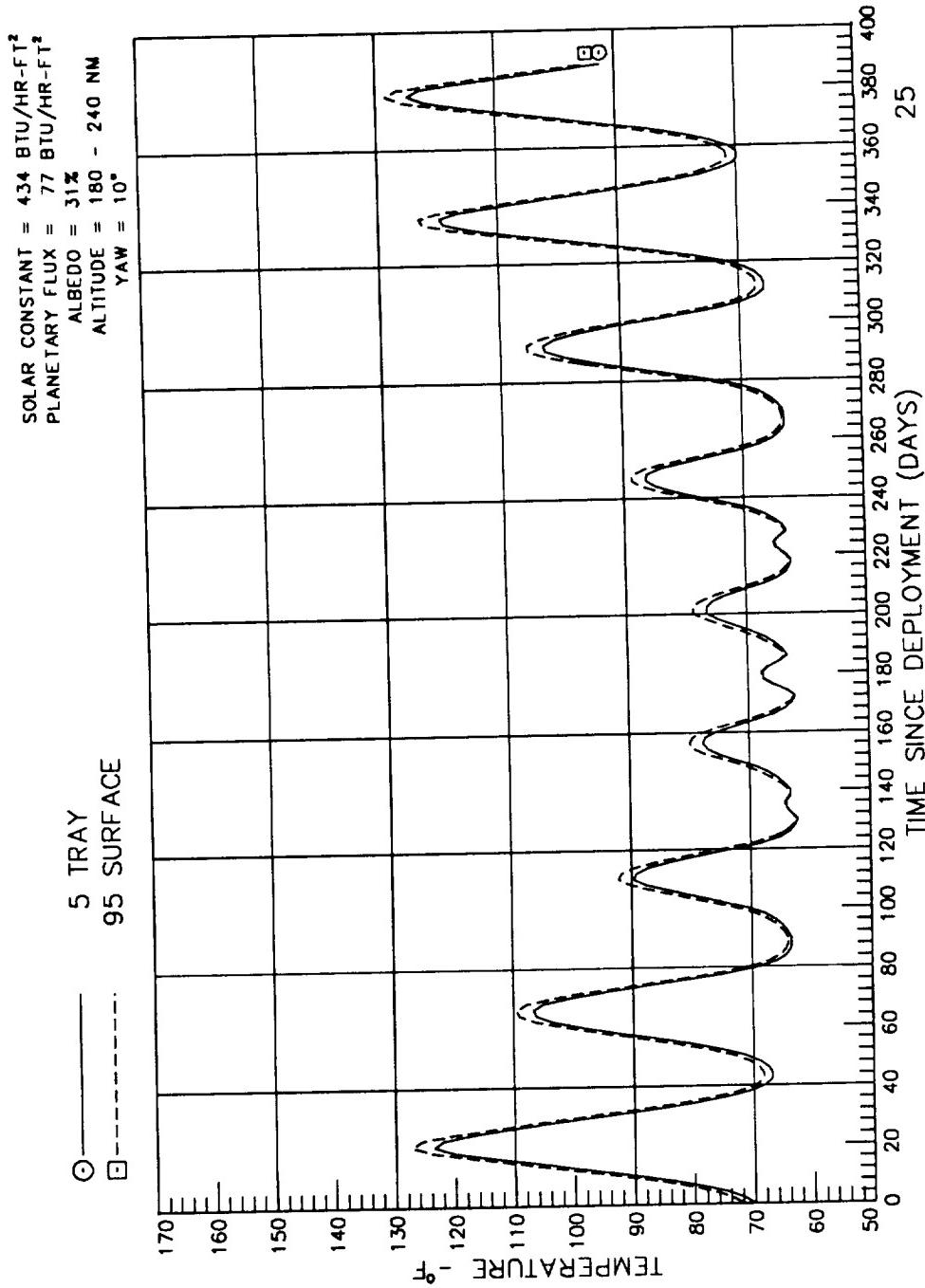
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E4



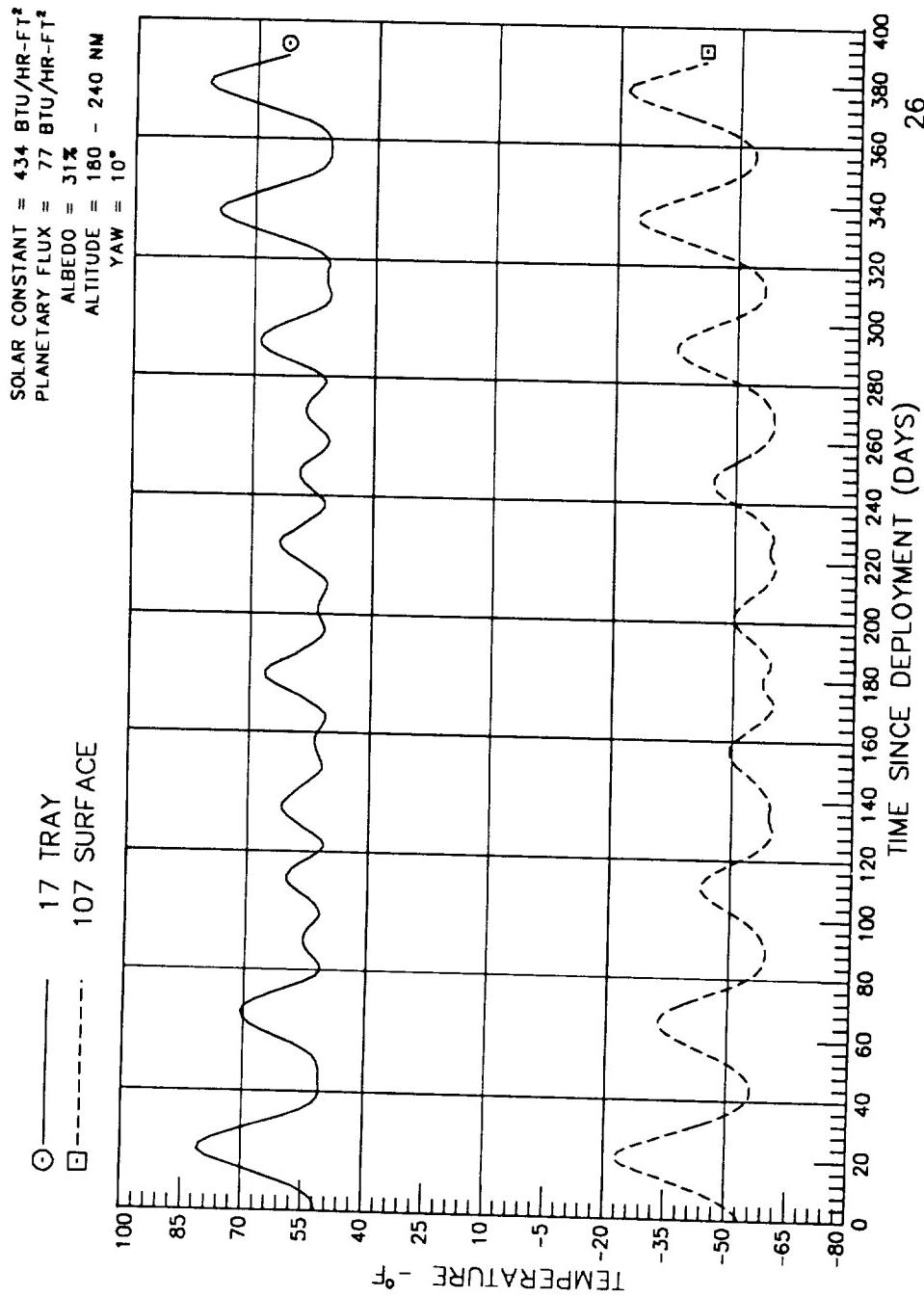
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F4



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A5



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B5



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C5

SOLAR CONSTANT = 434 BTU/HR-F²

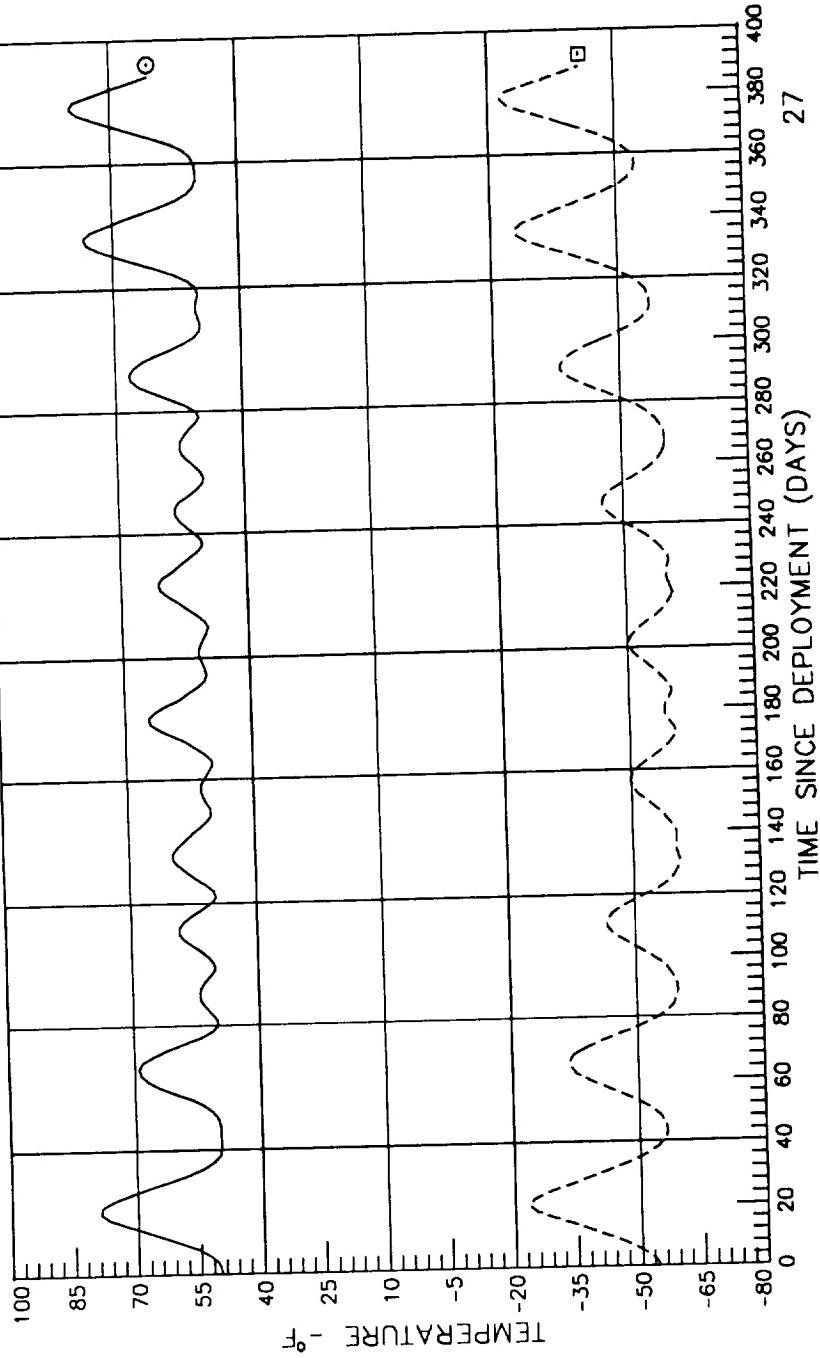
PLANETARY FLUX = 77 BTU/HR-F²

ALBEDO = 31%

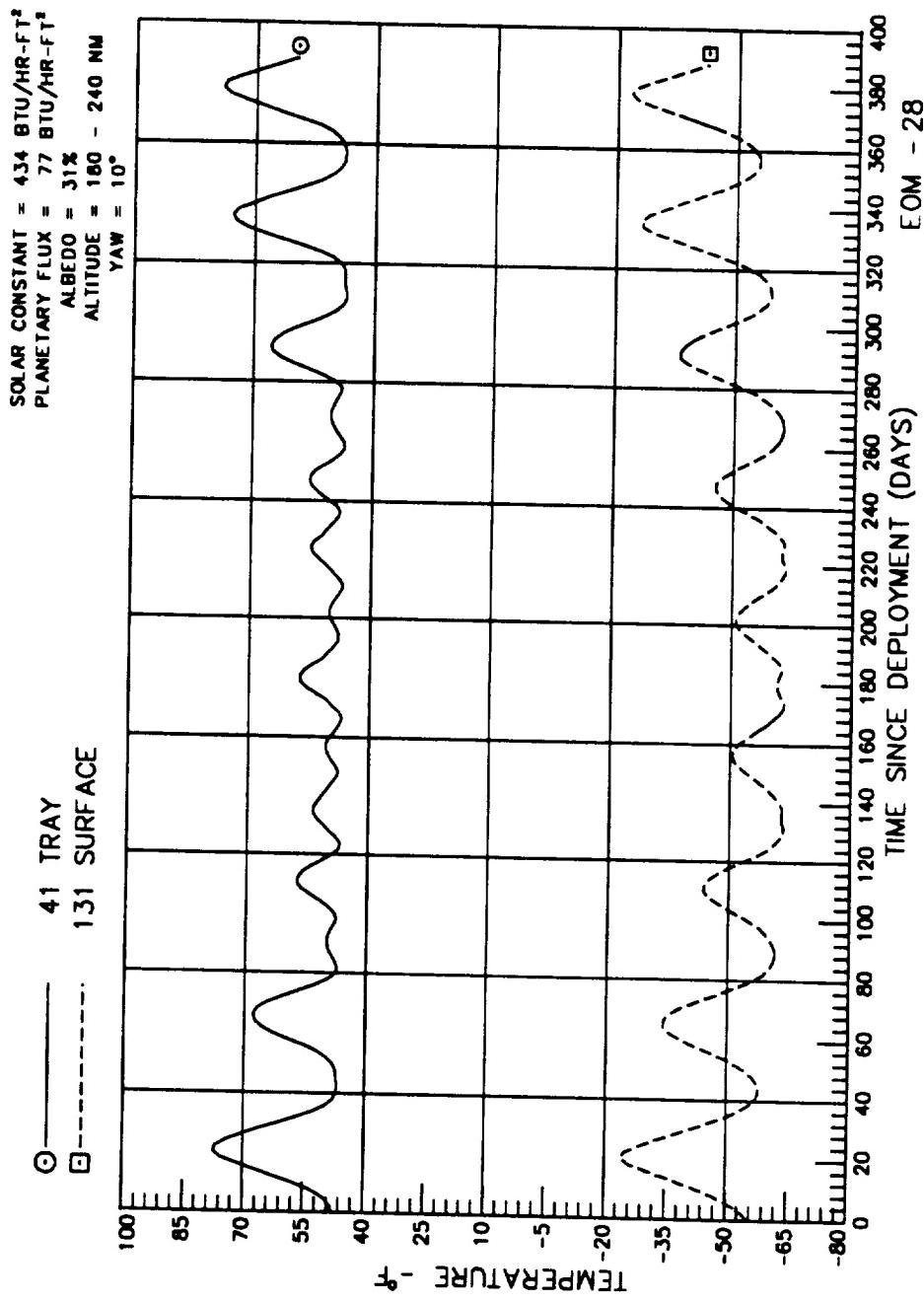
ALTITUDE = 180 - 240 NM

YAW = 10°

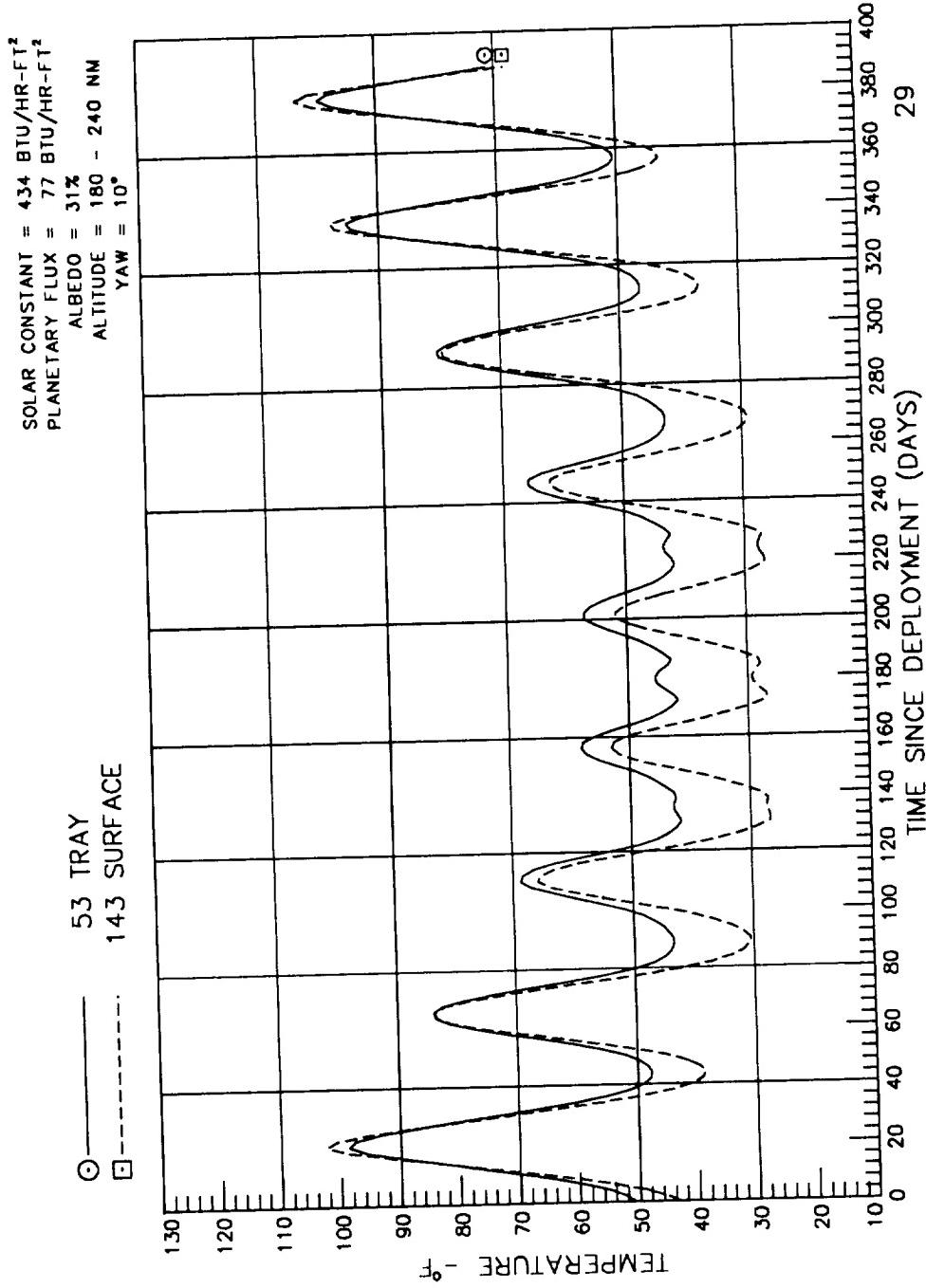
— 29 TRAY
 ... 119 SURFACE



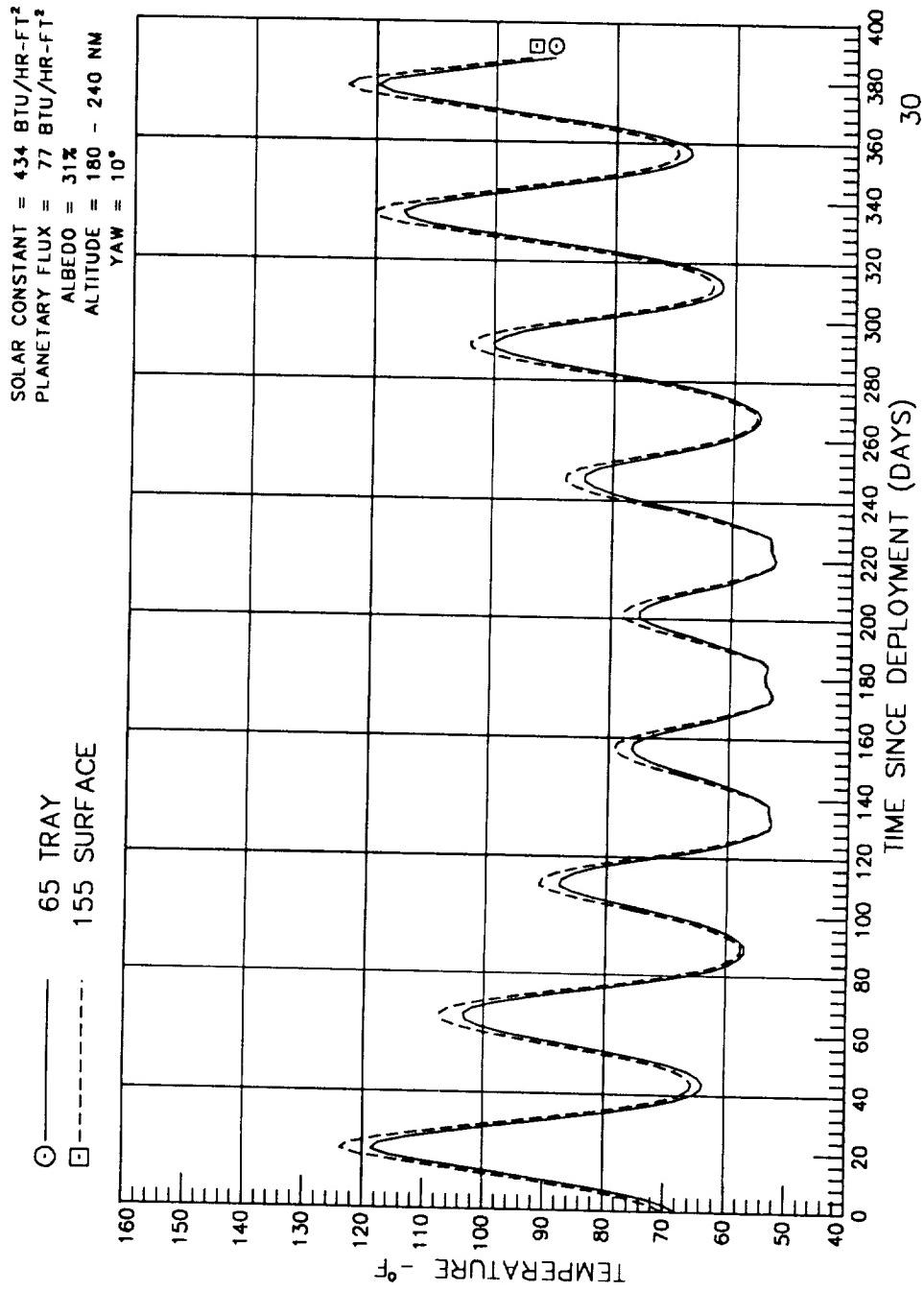
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: 05



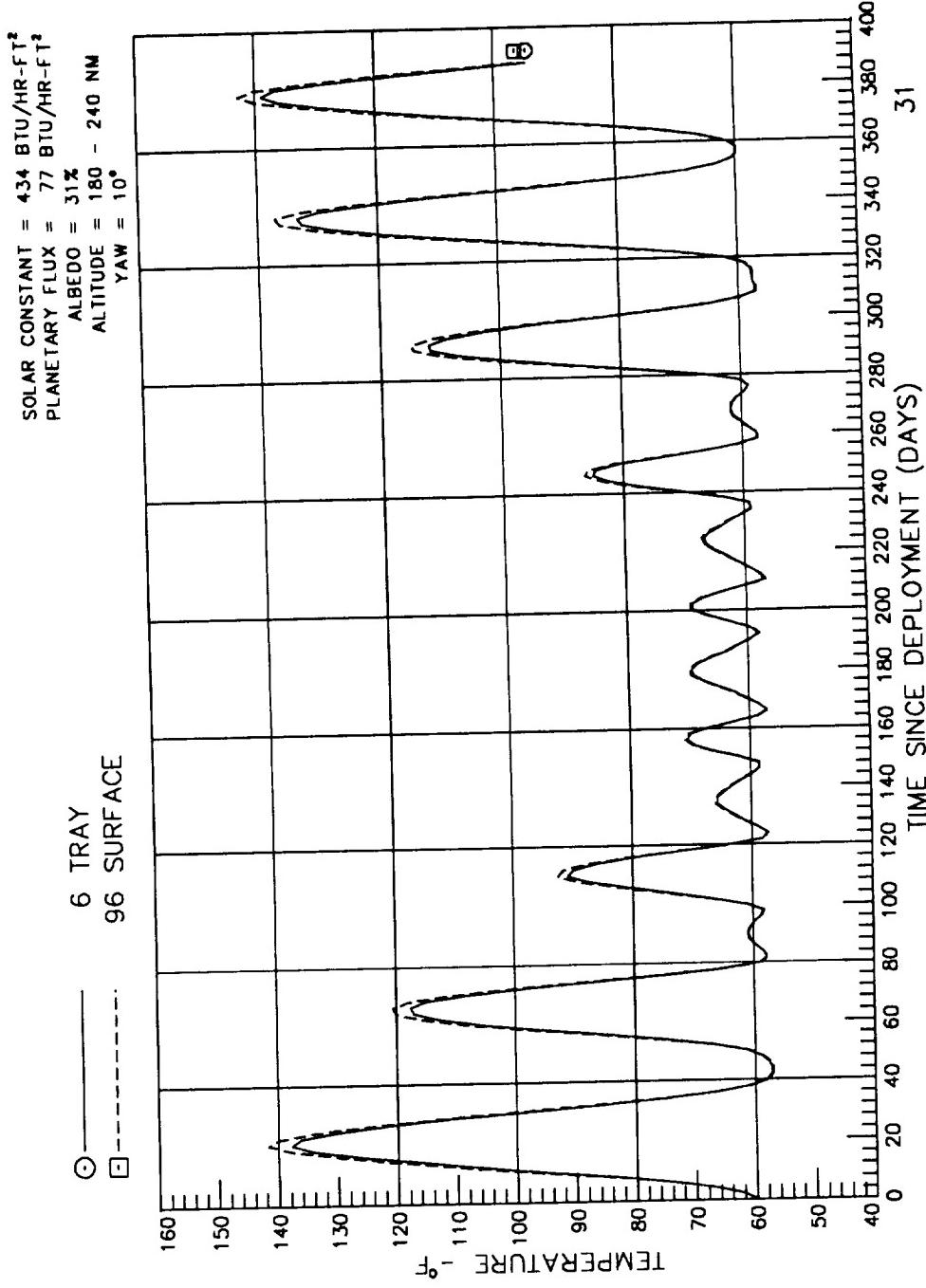
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E5



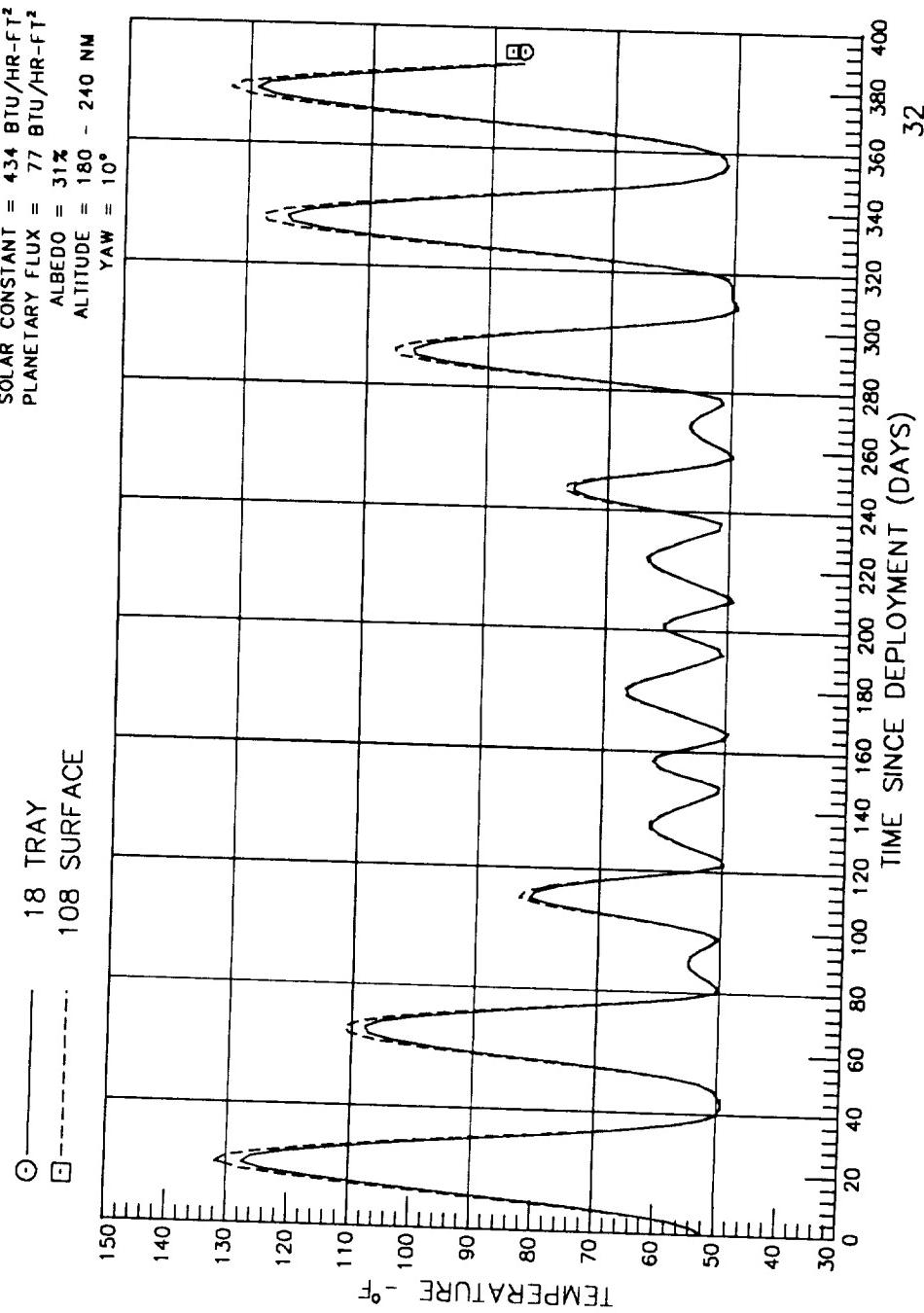
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F5



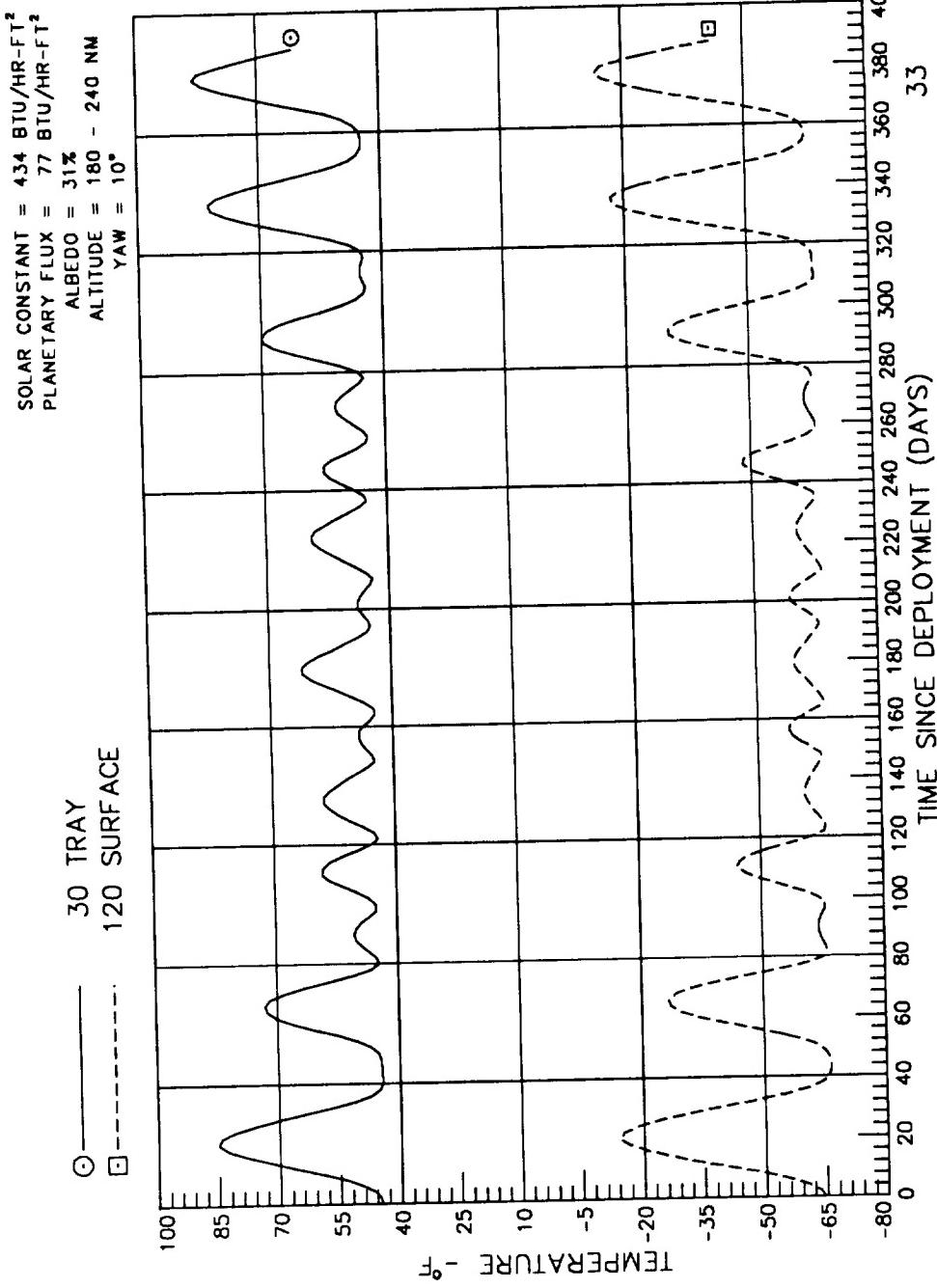
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A6



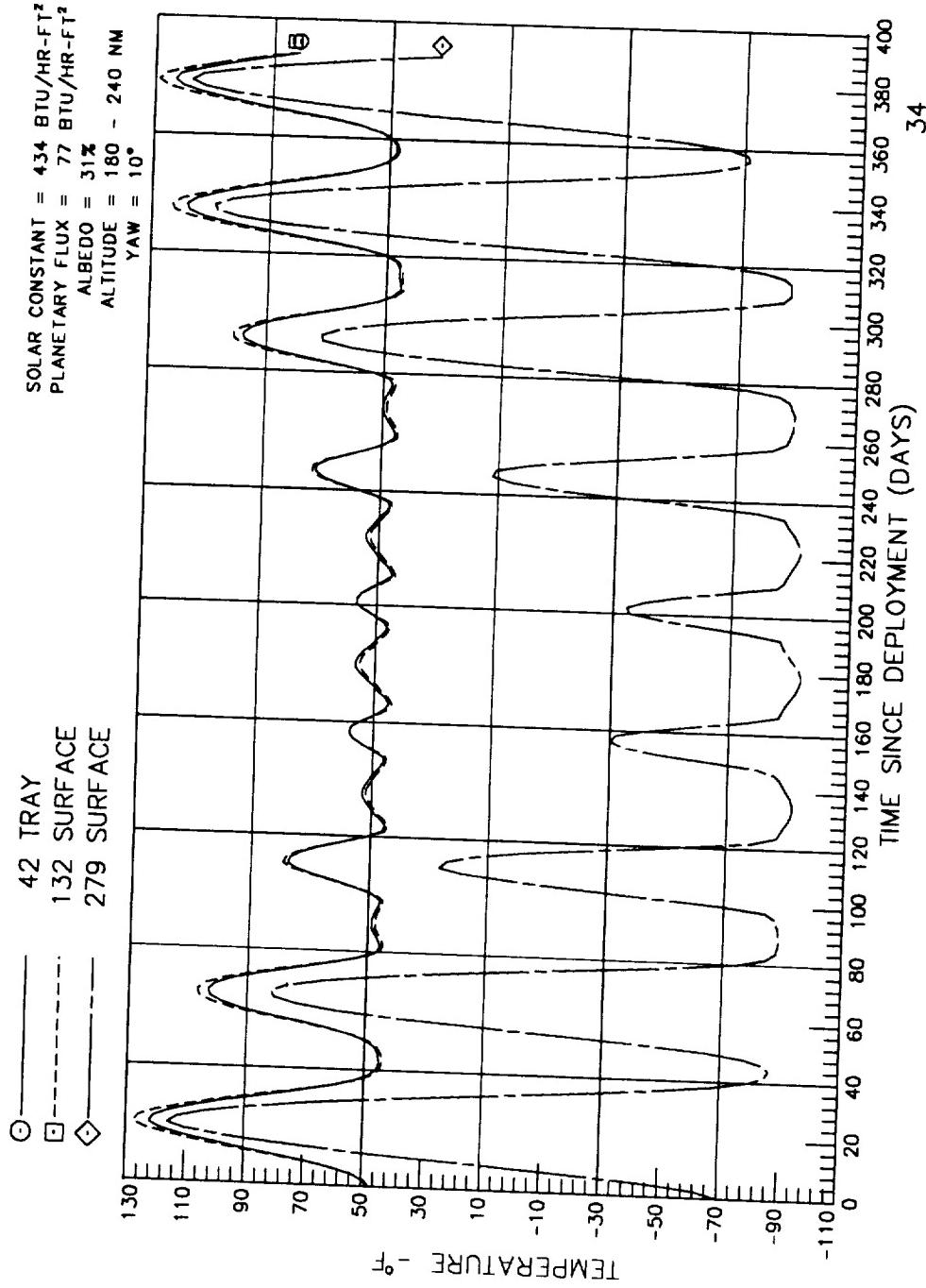
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B6



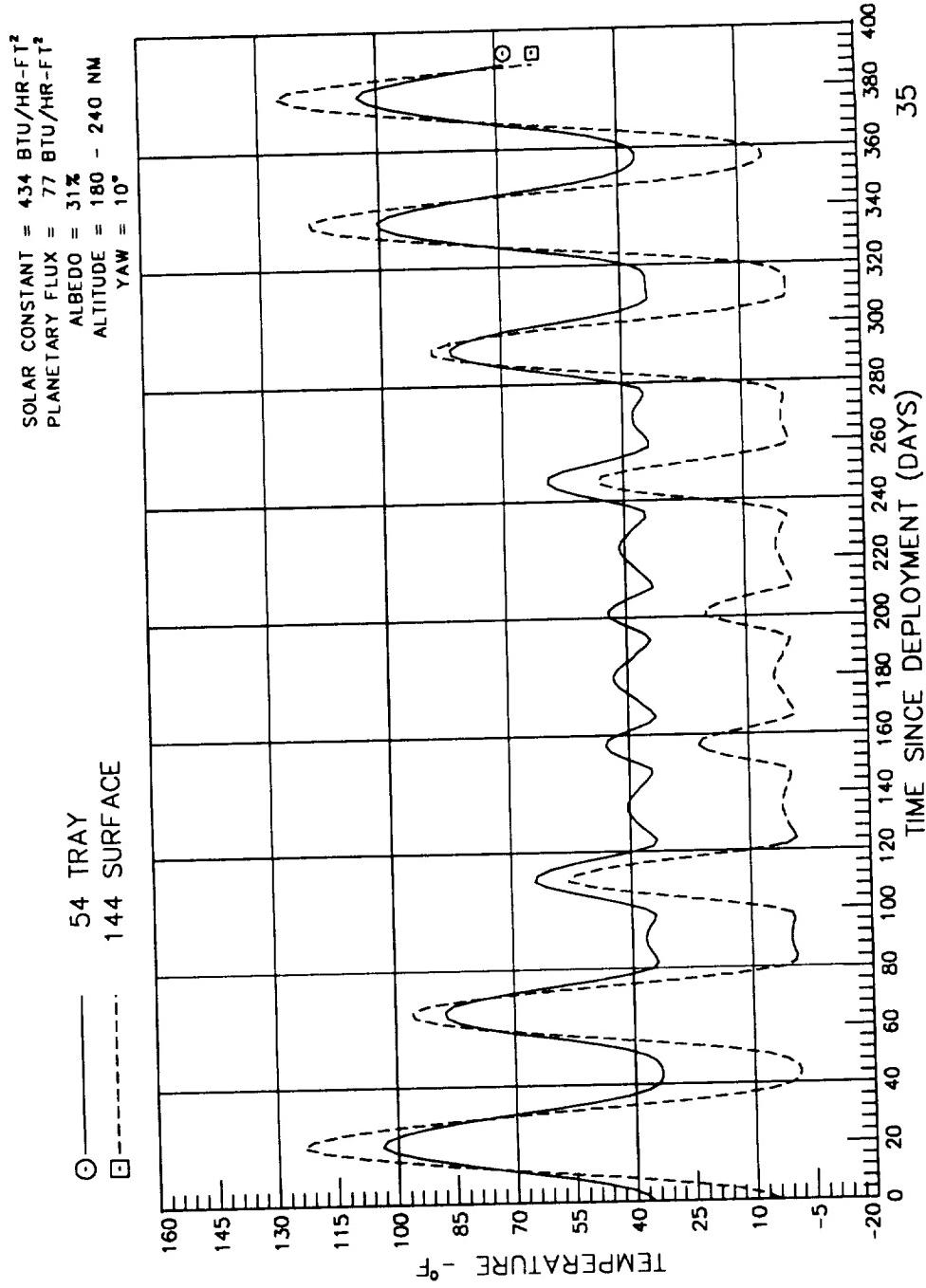
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C6



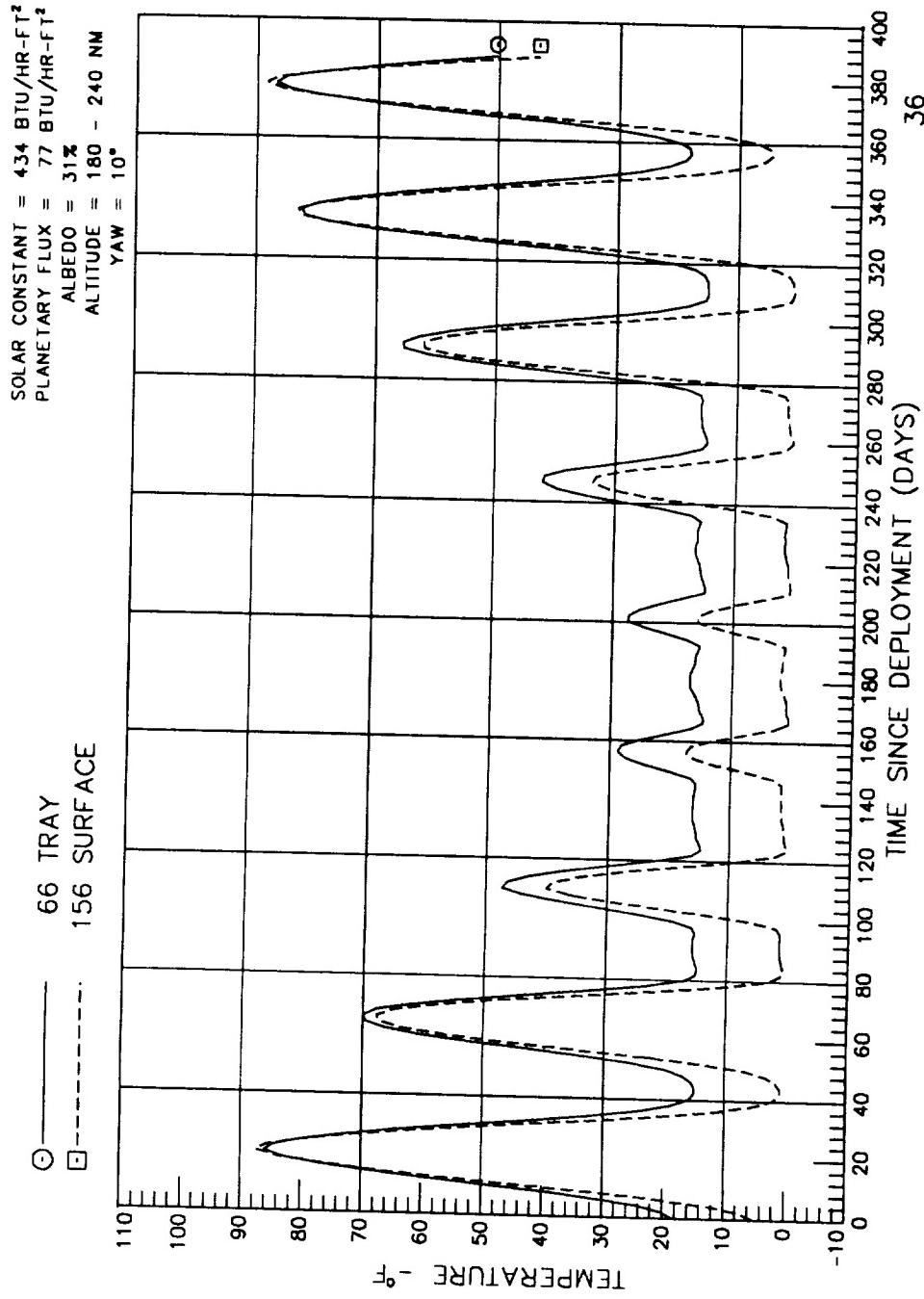
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D6



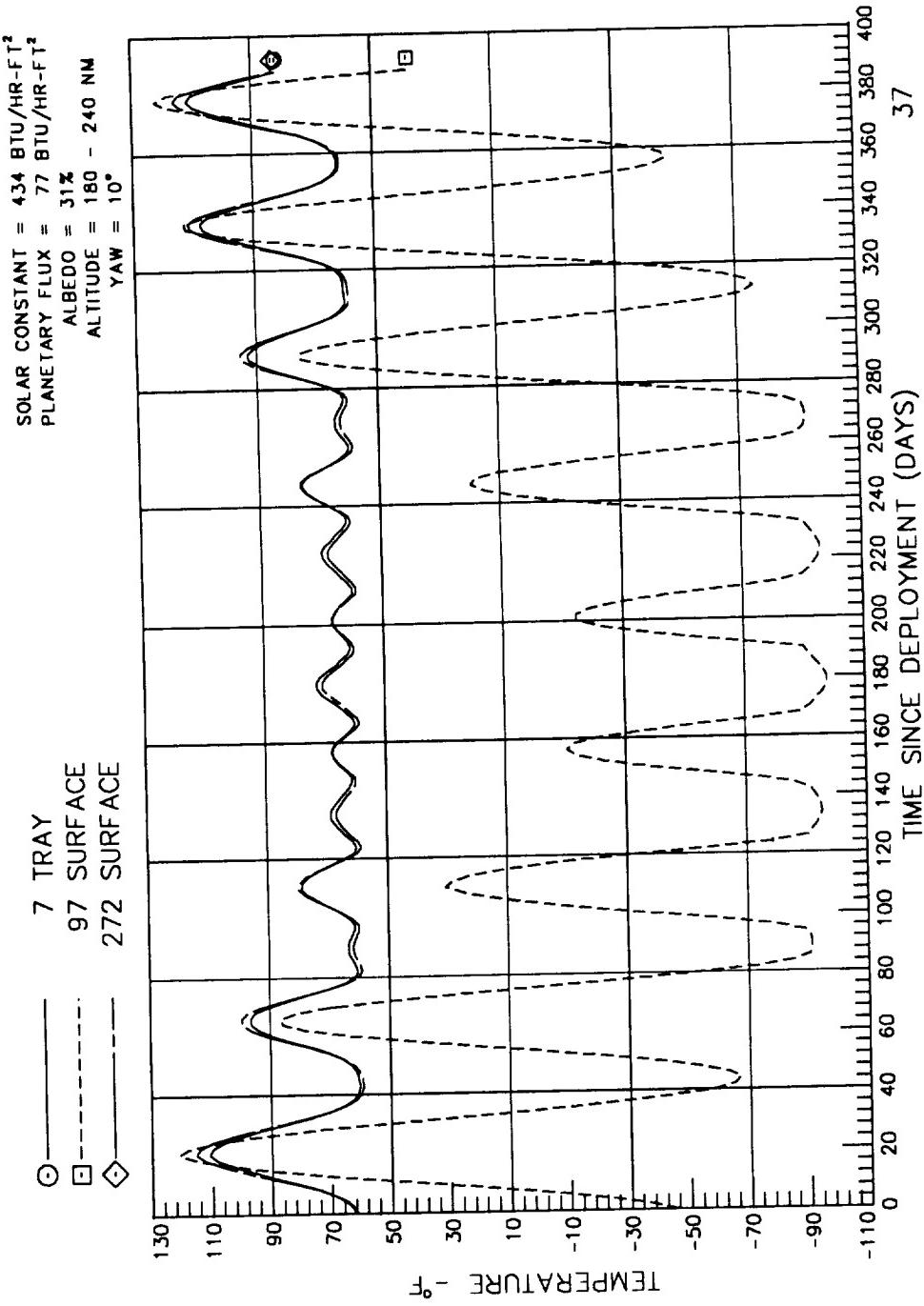
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E6



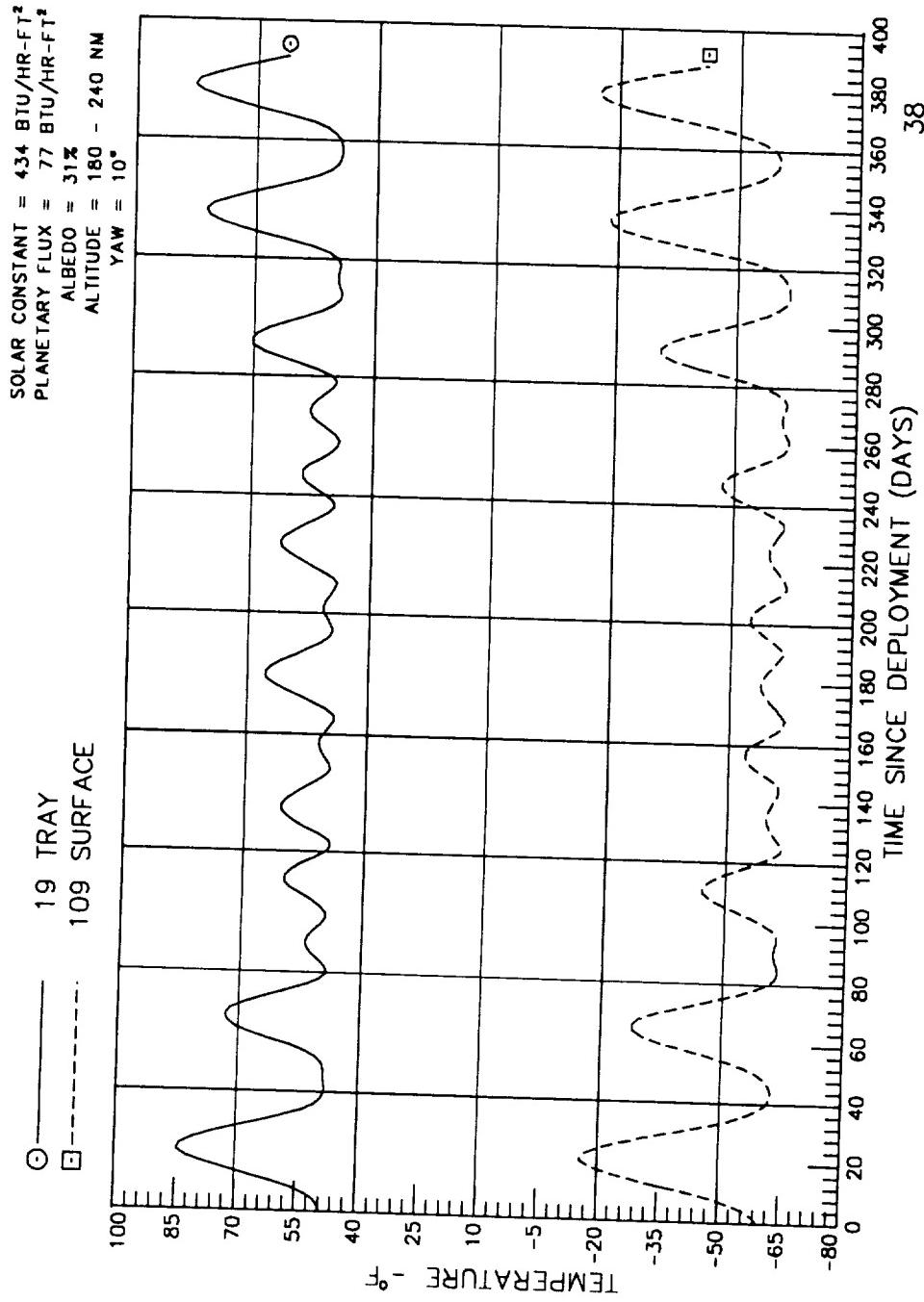
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F6



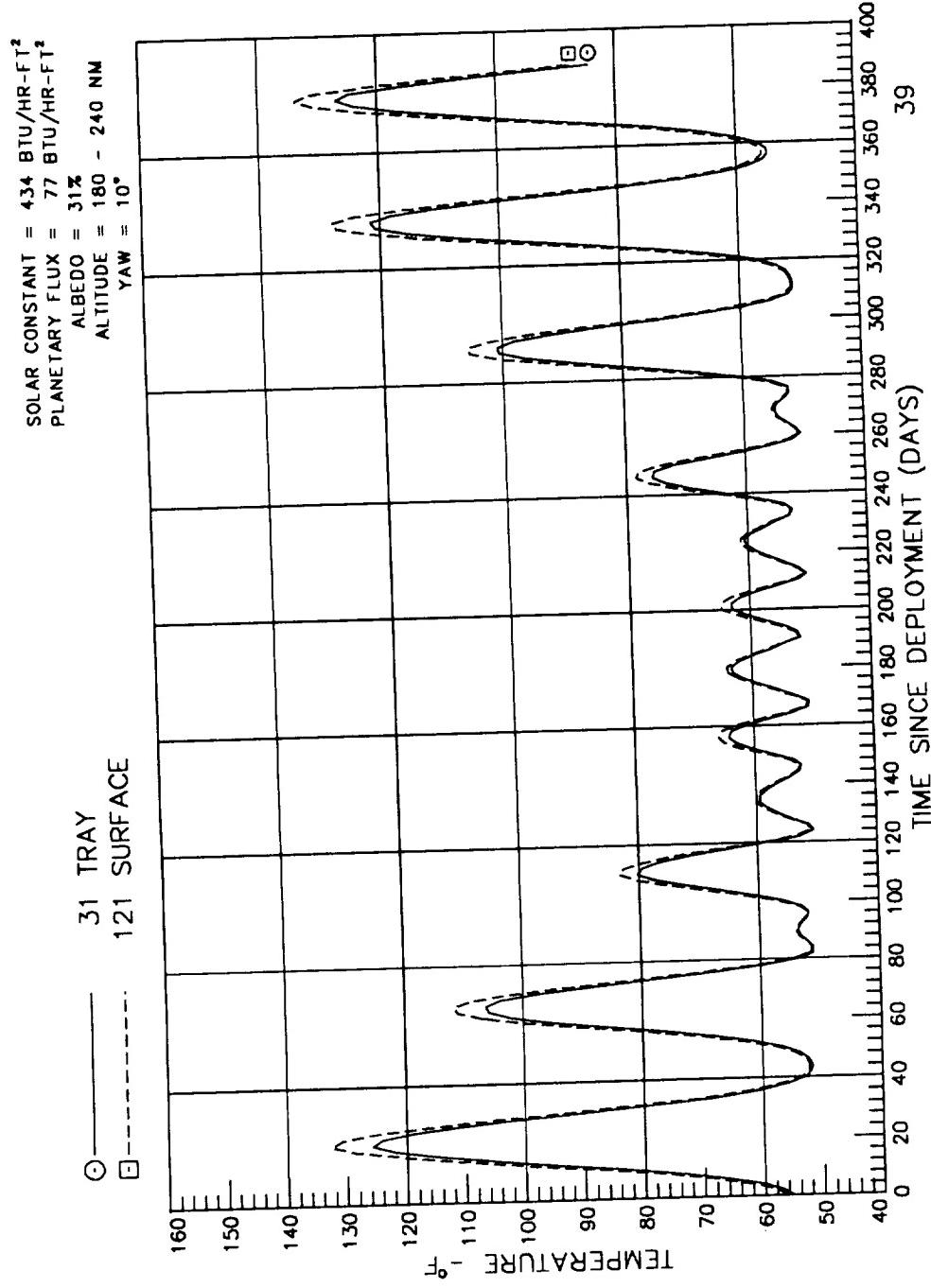
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
LOCATION: A7



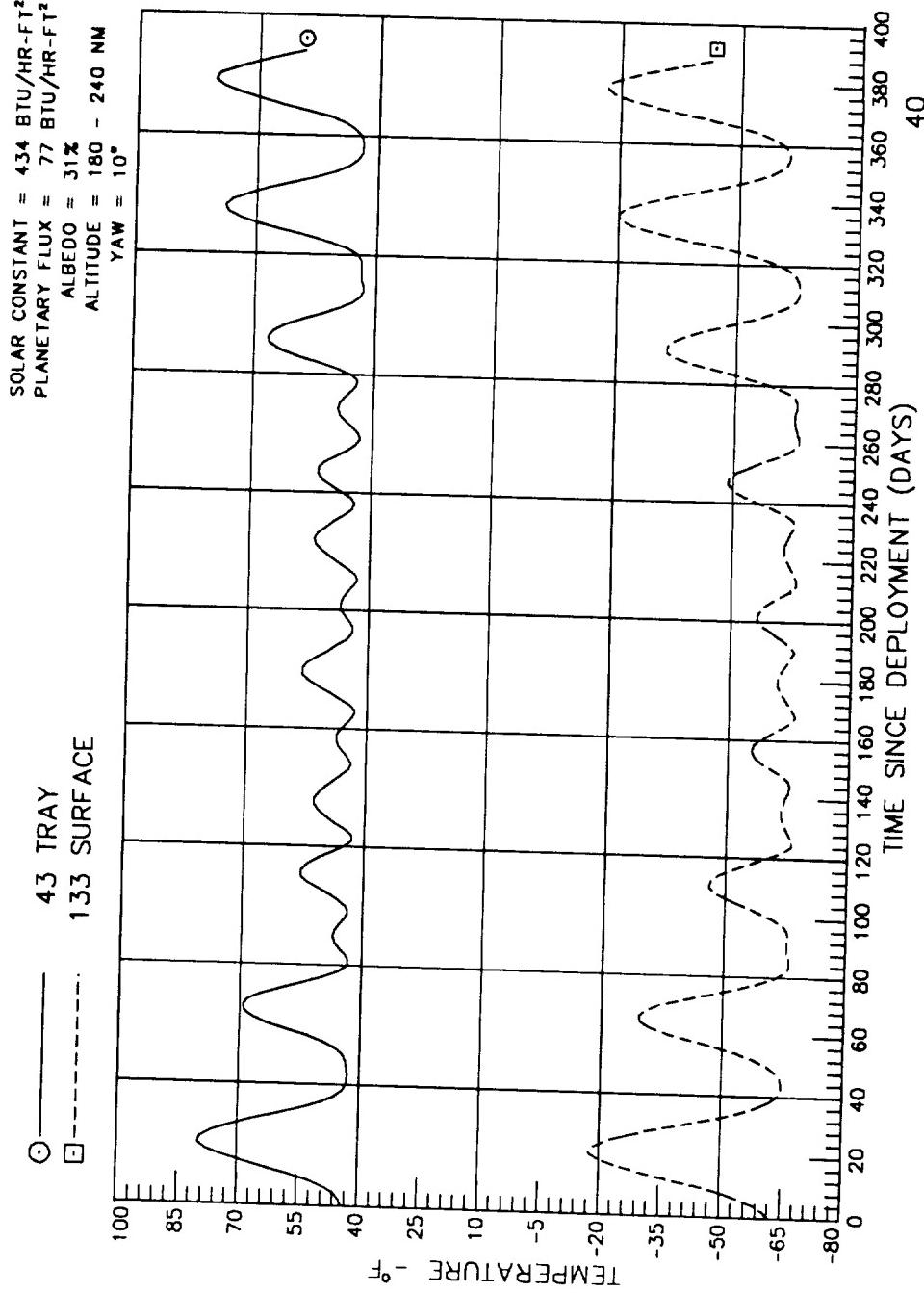
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B7



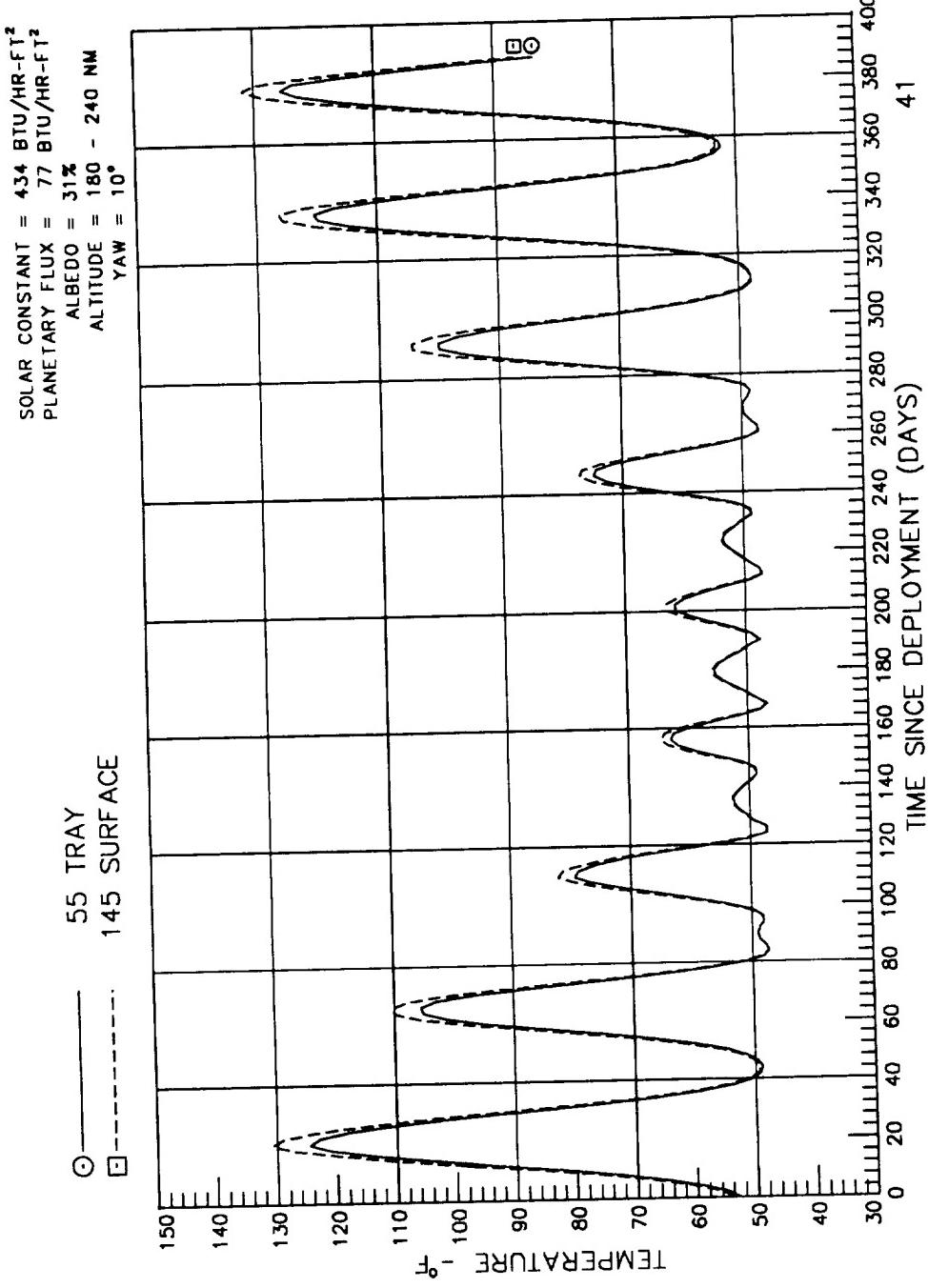
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C7



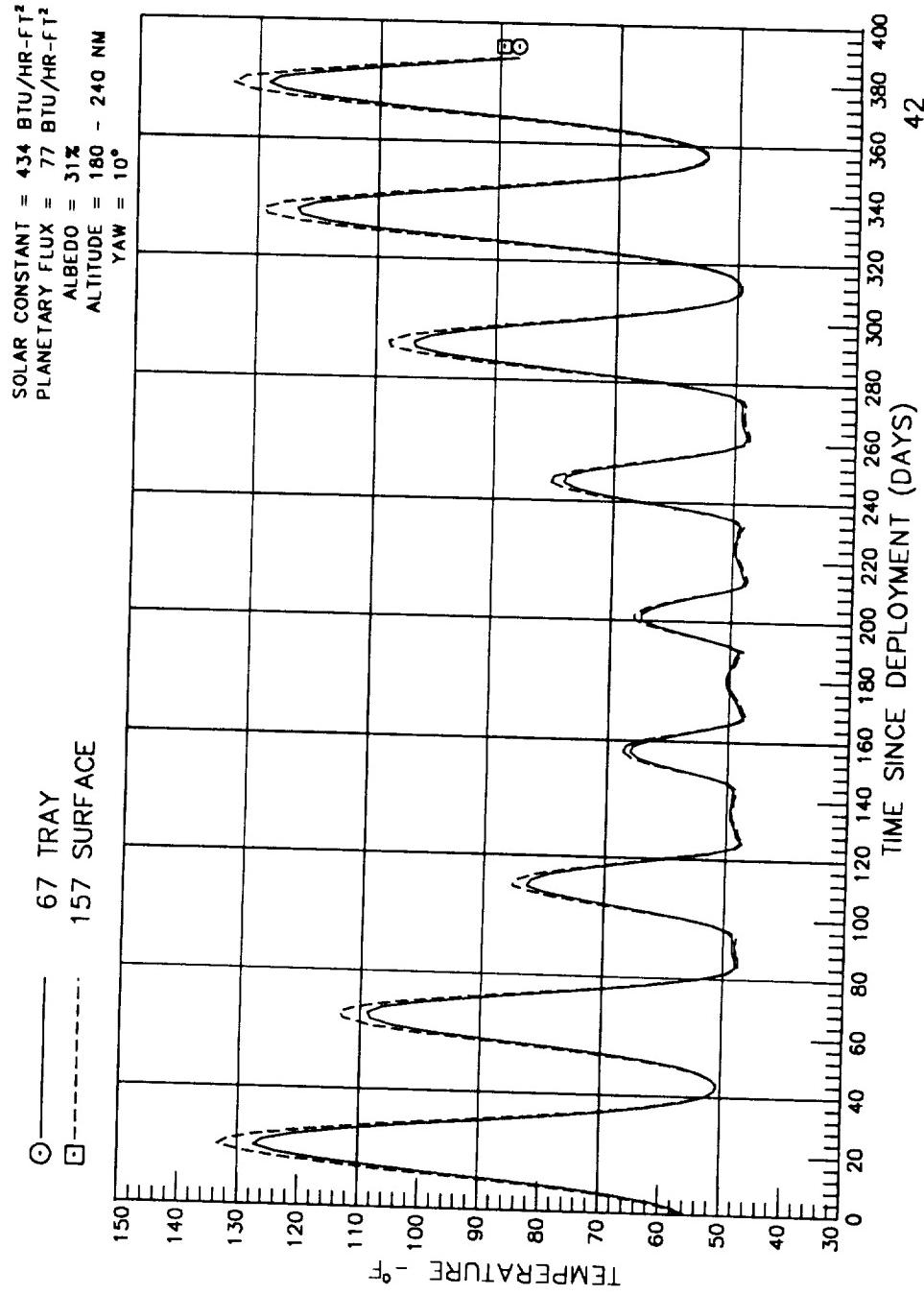
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D7



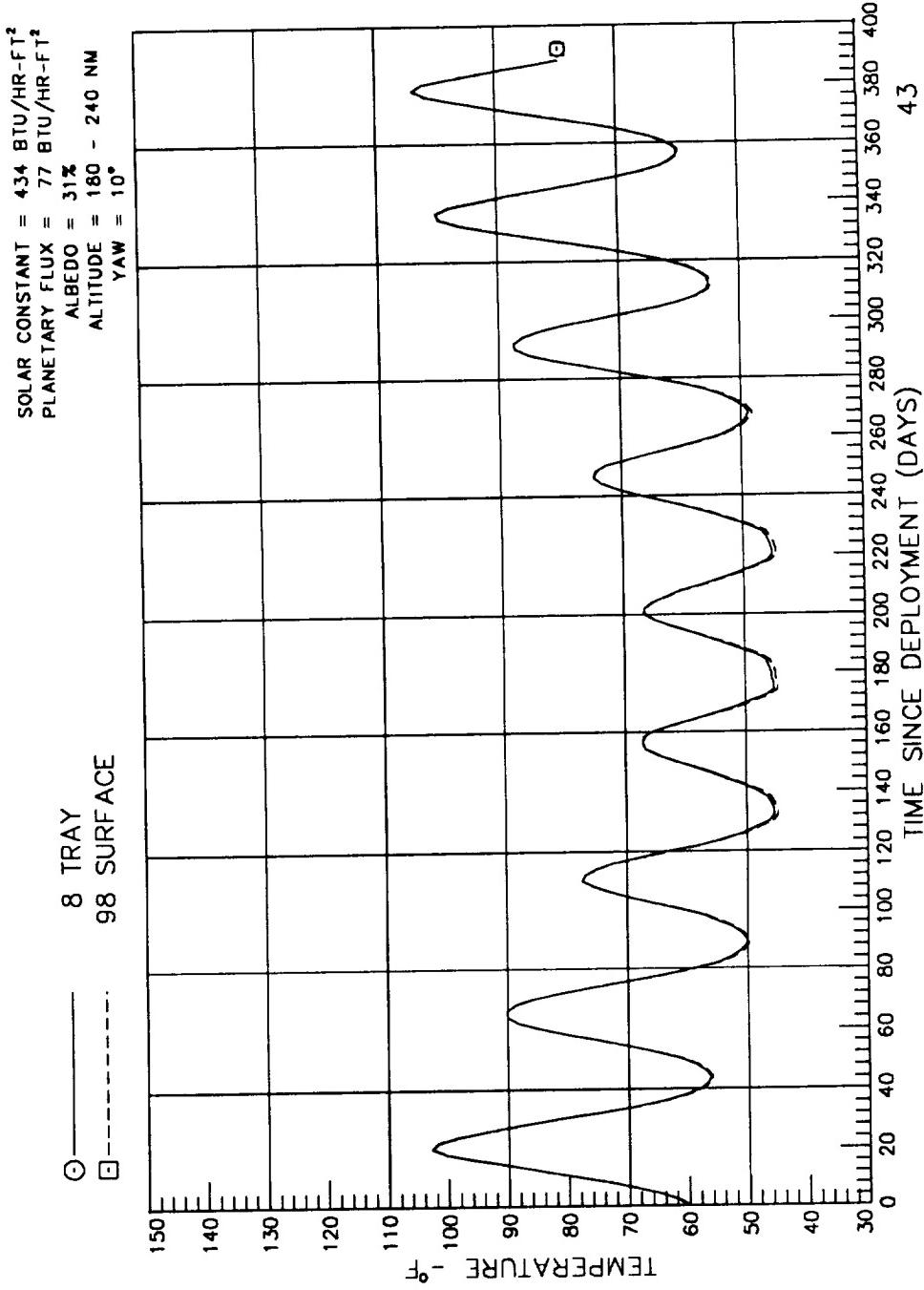
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E7



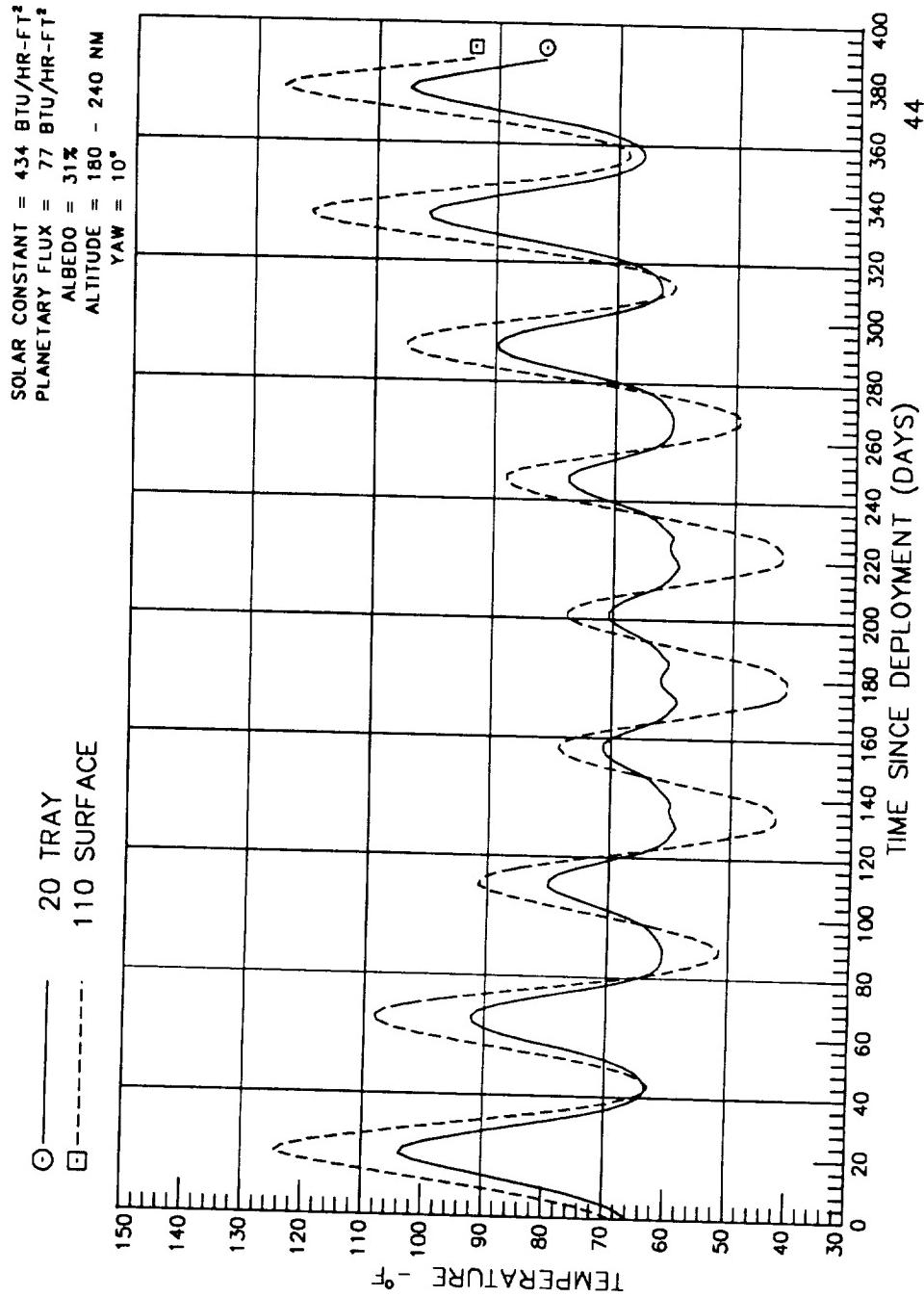
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F7



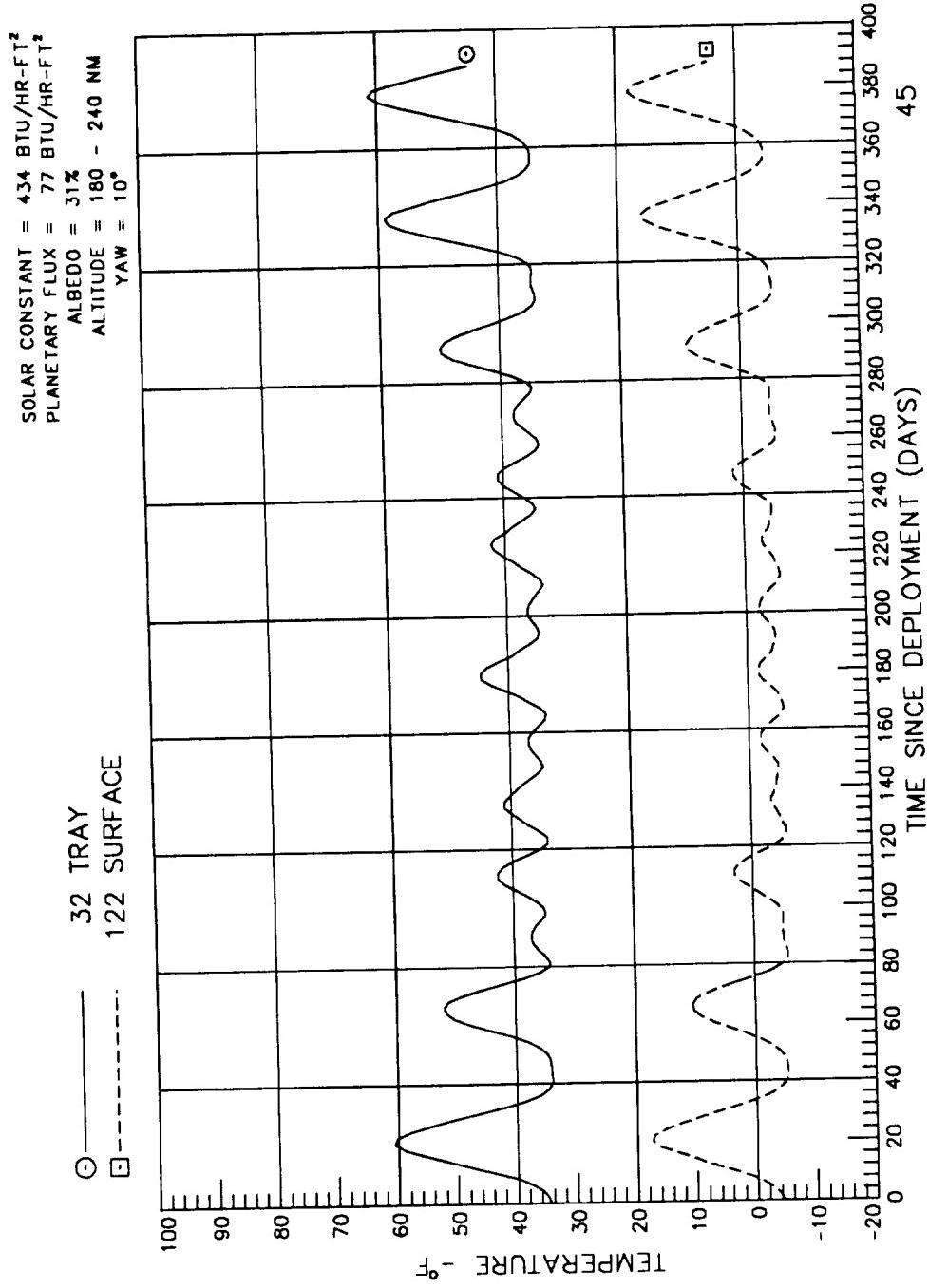
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A8



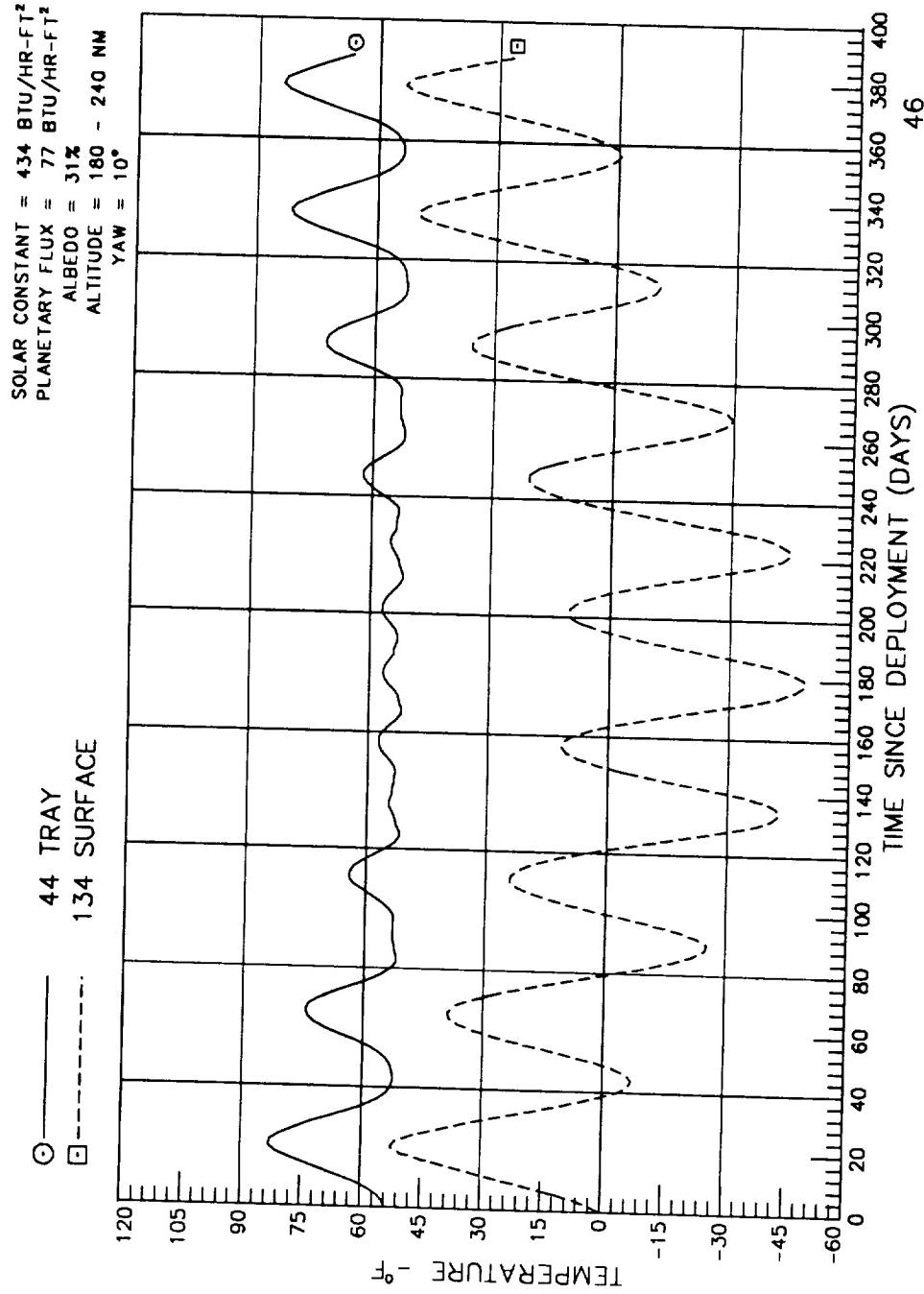
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B8



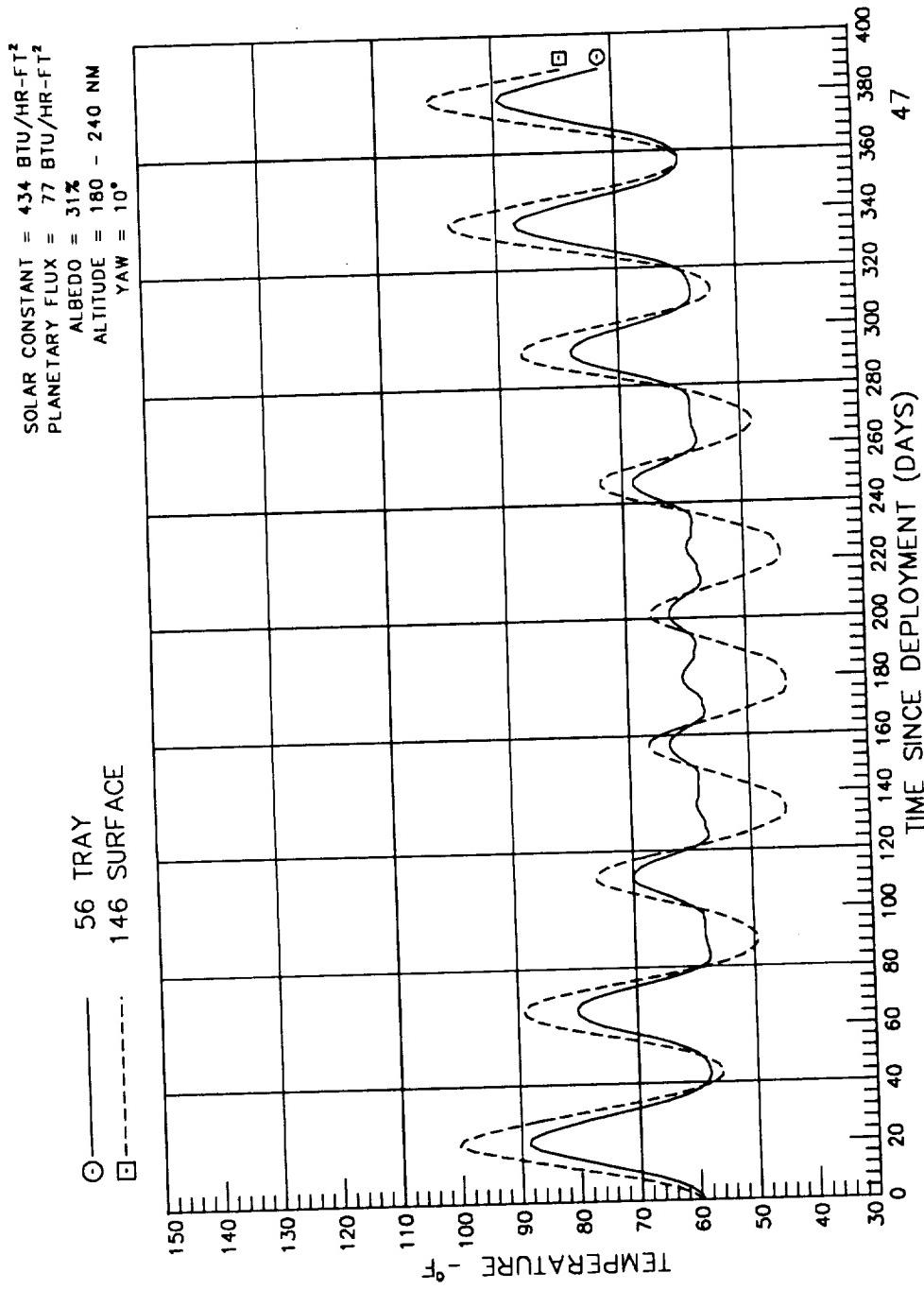
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C8



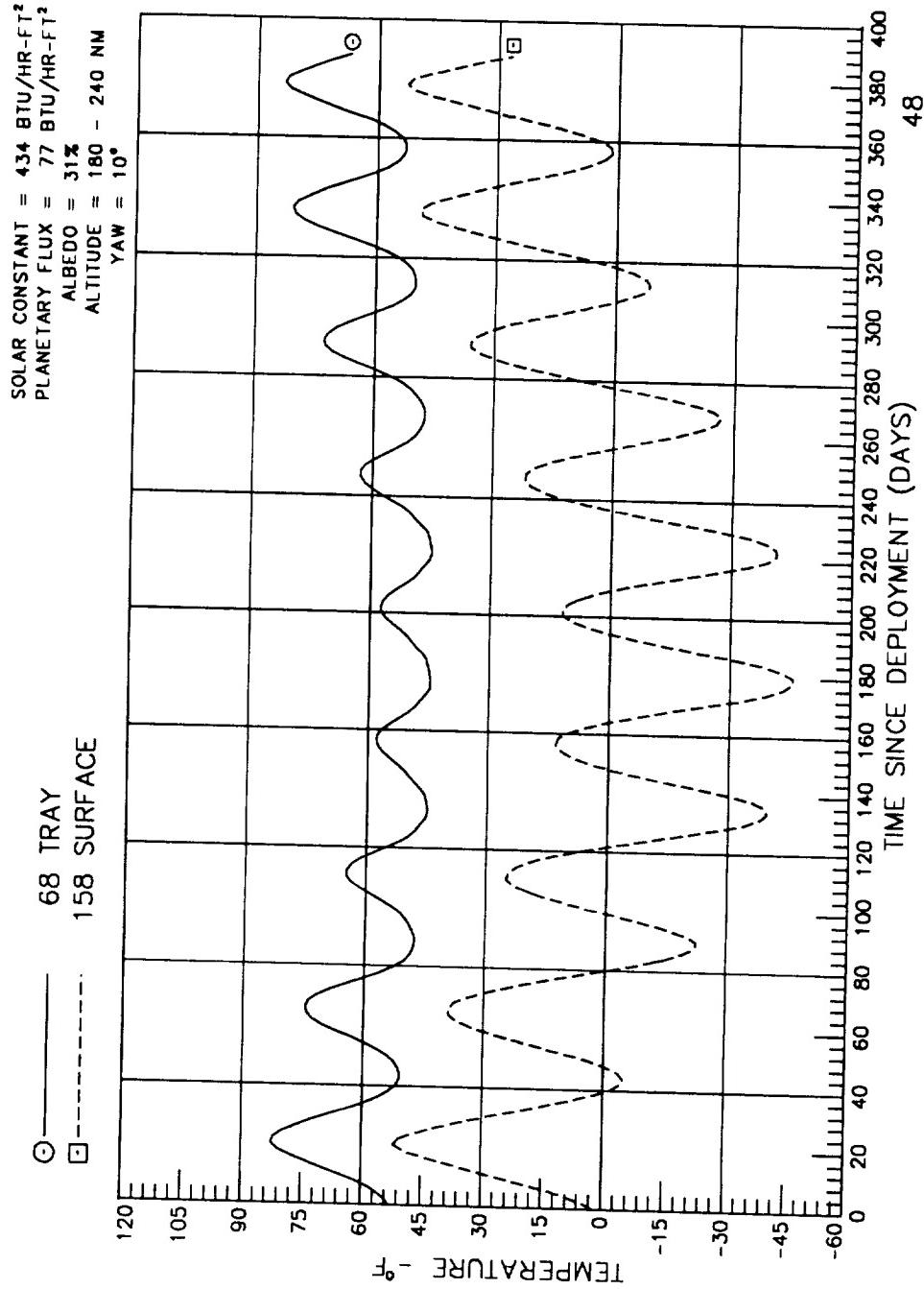
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D8



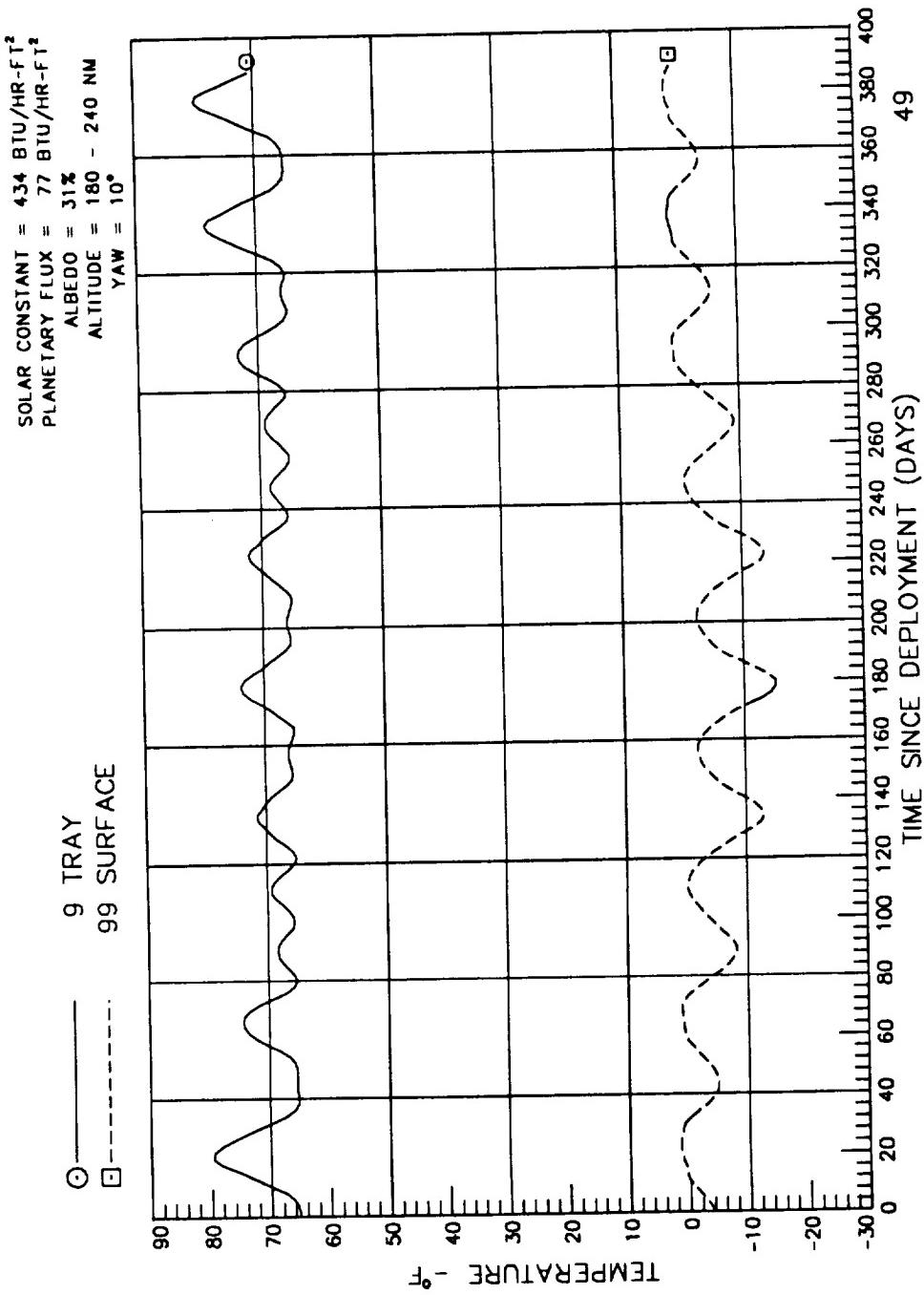
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E8



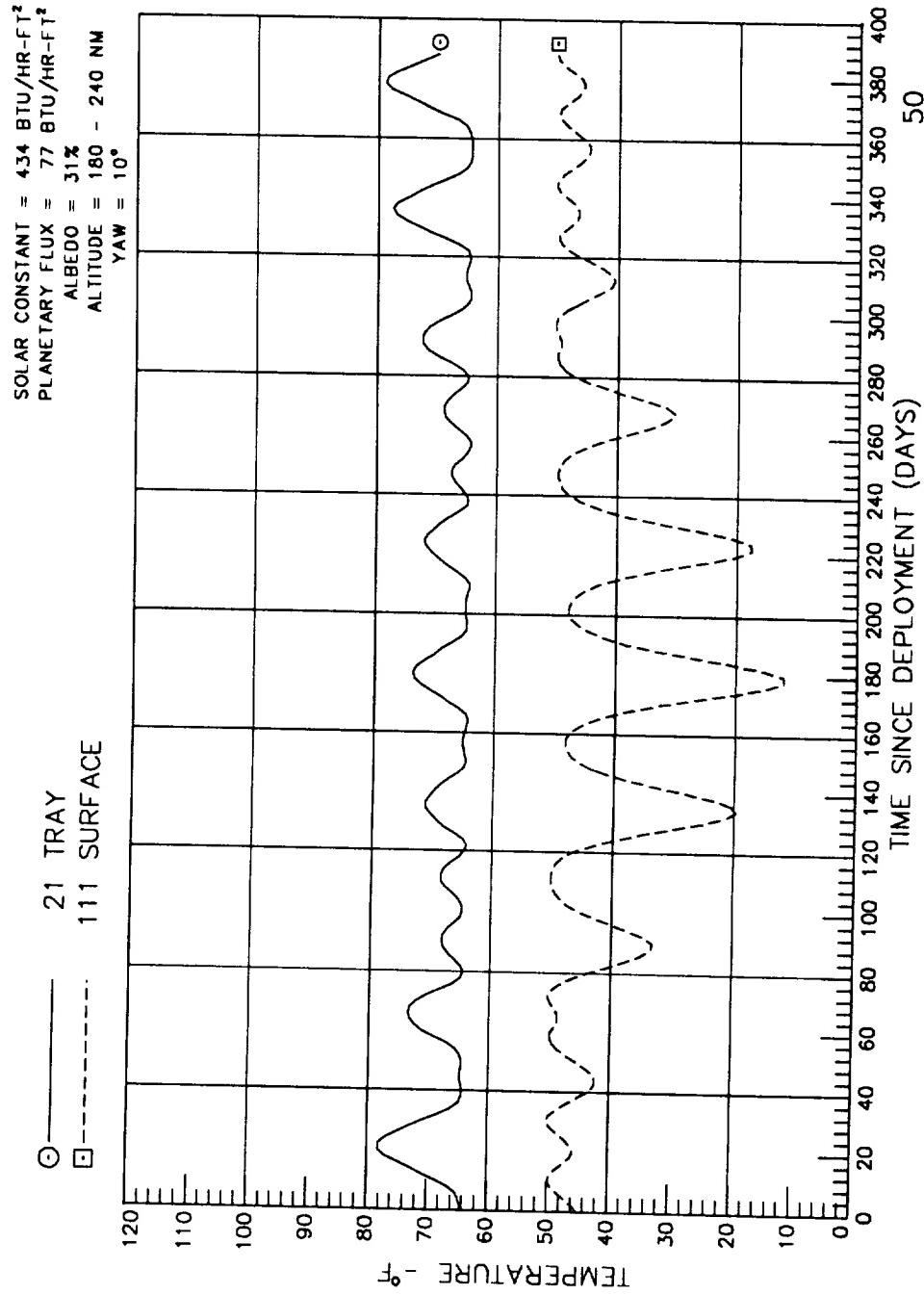
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F8



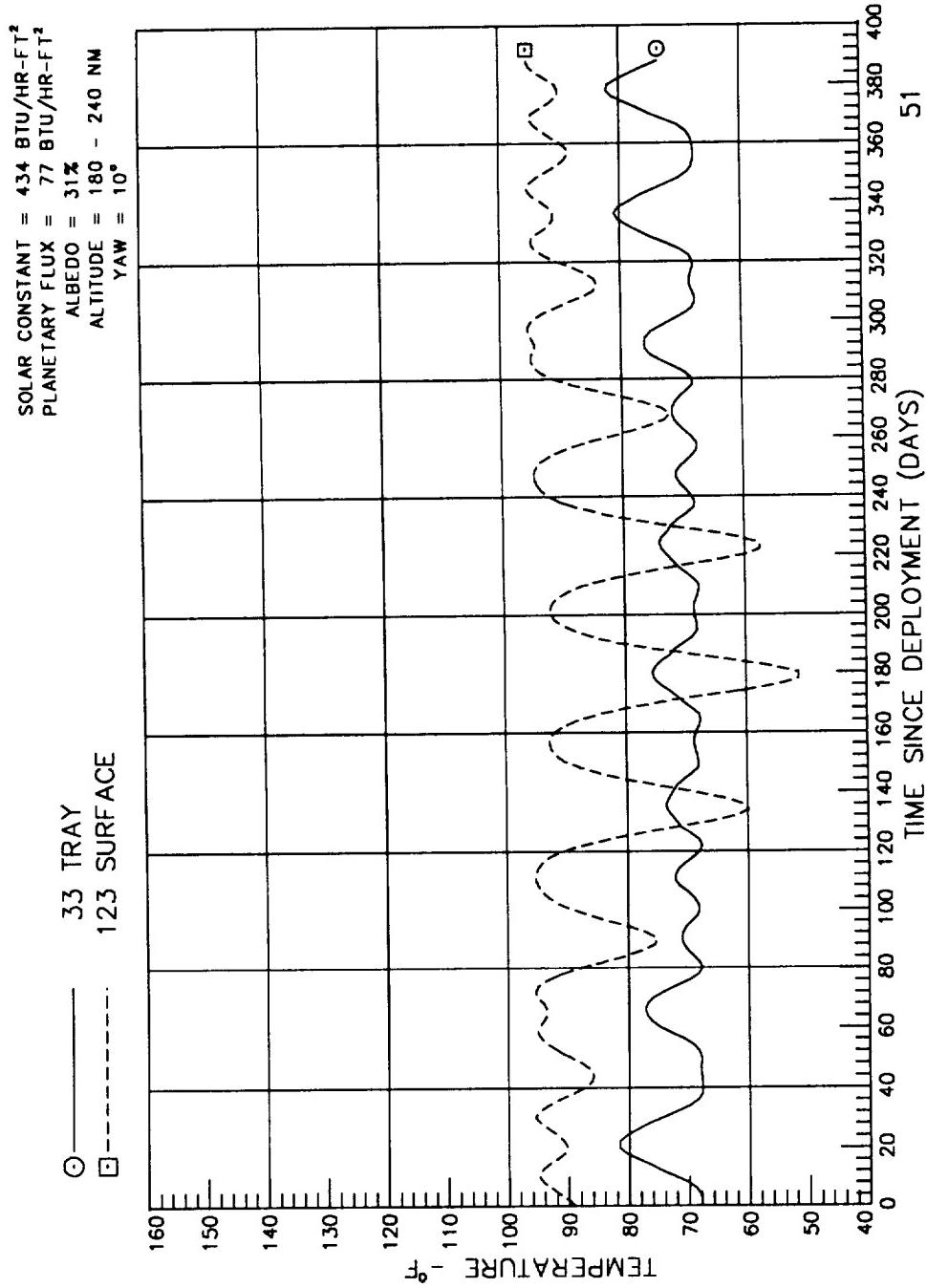
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A9



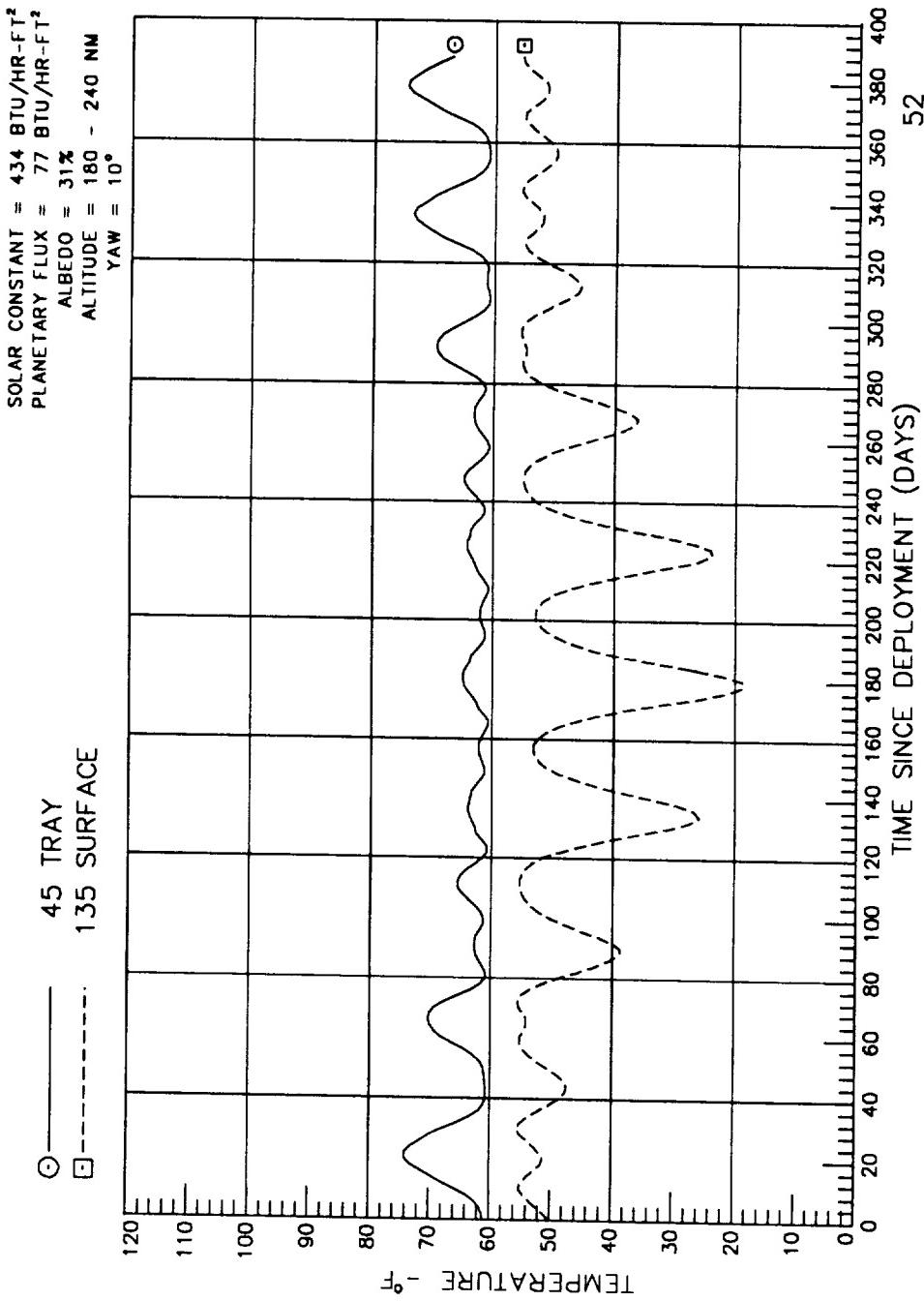
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B9



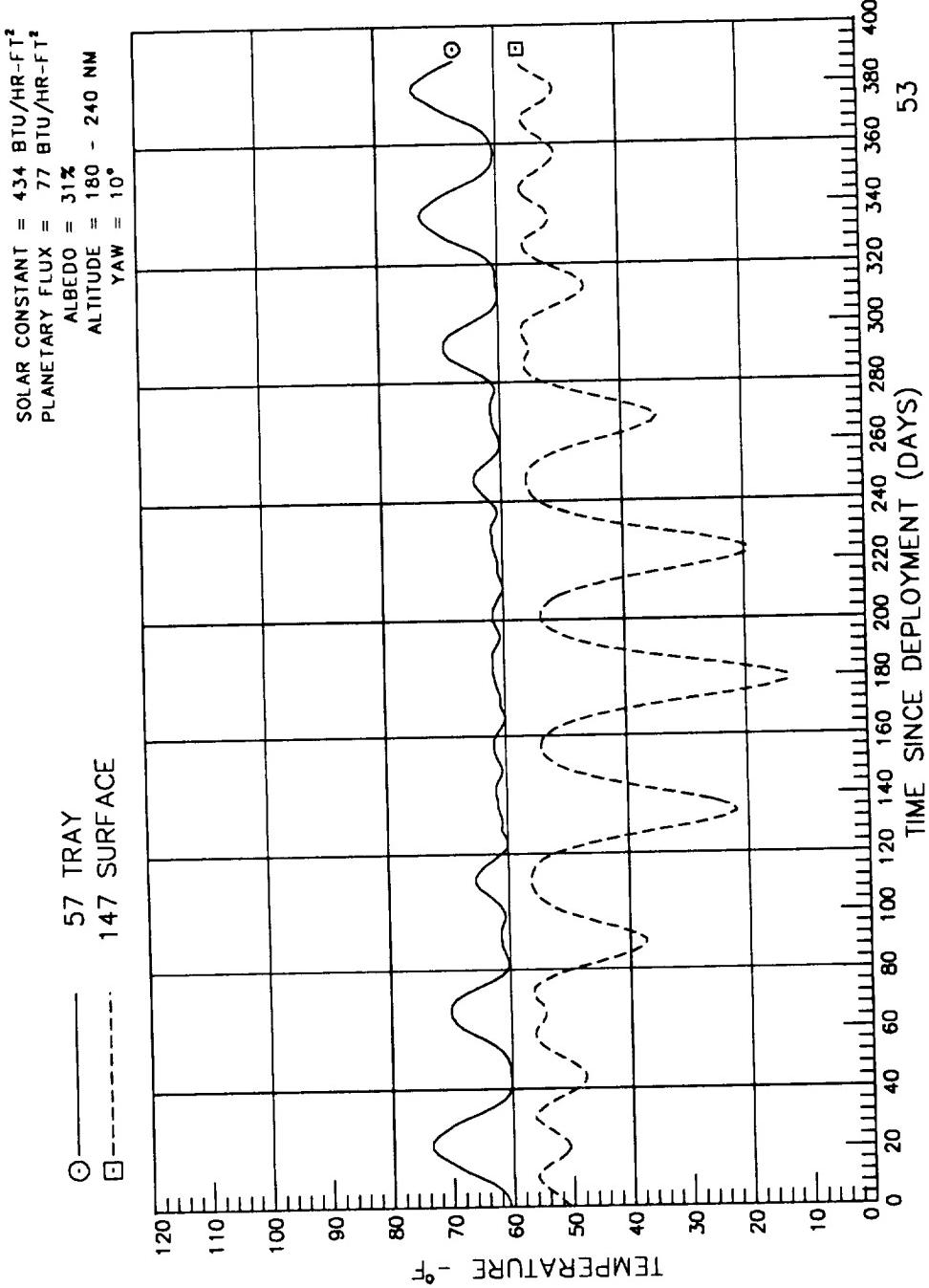
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C9



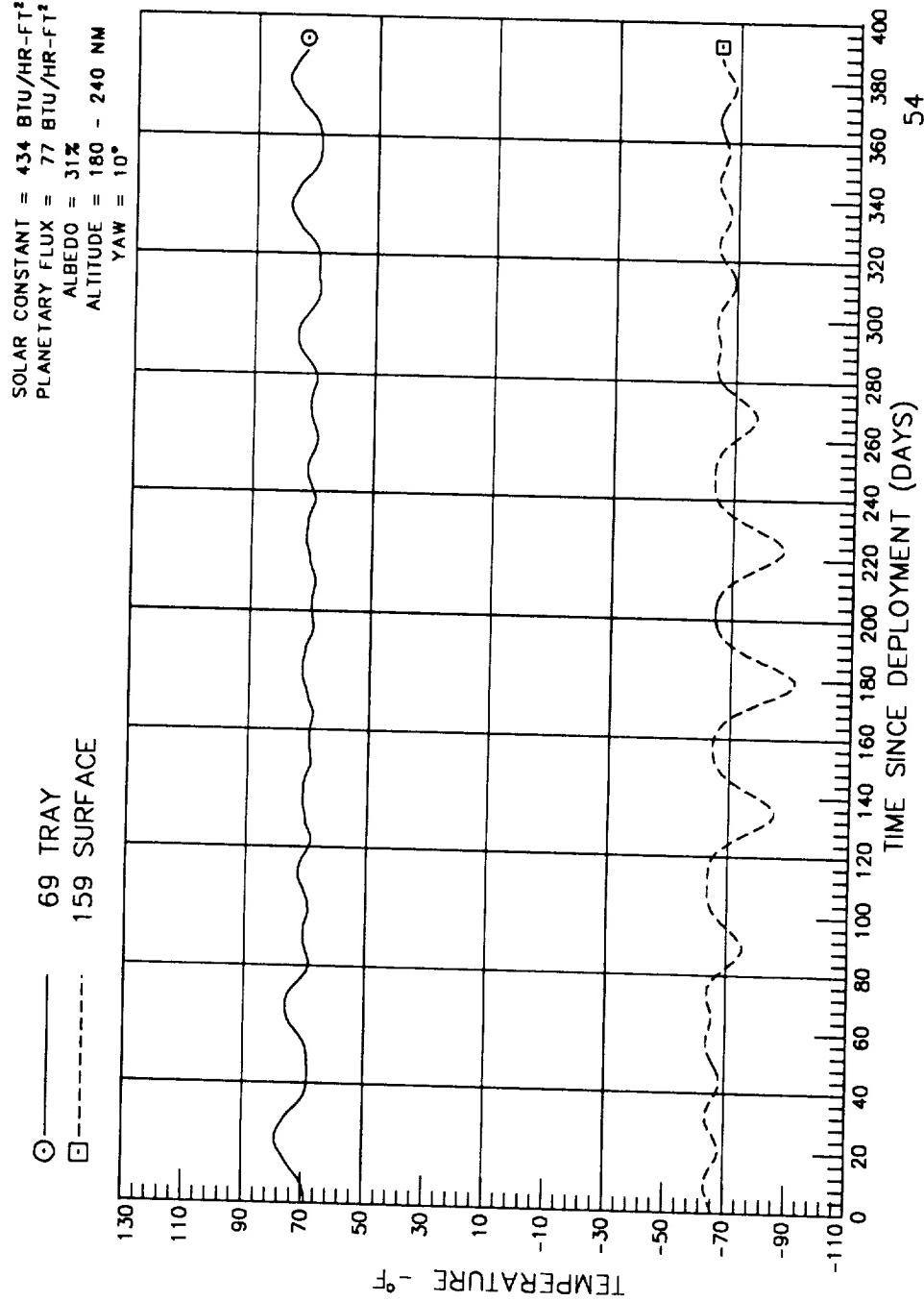
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D9



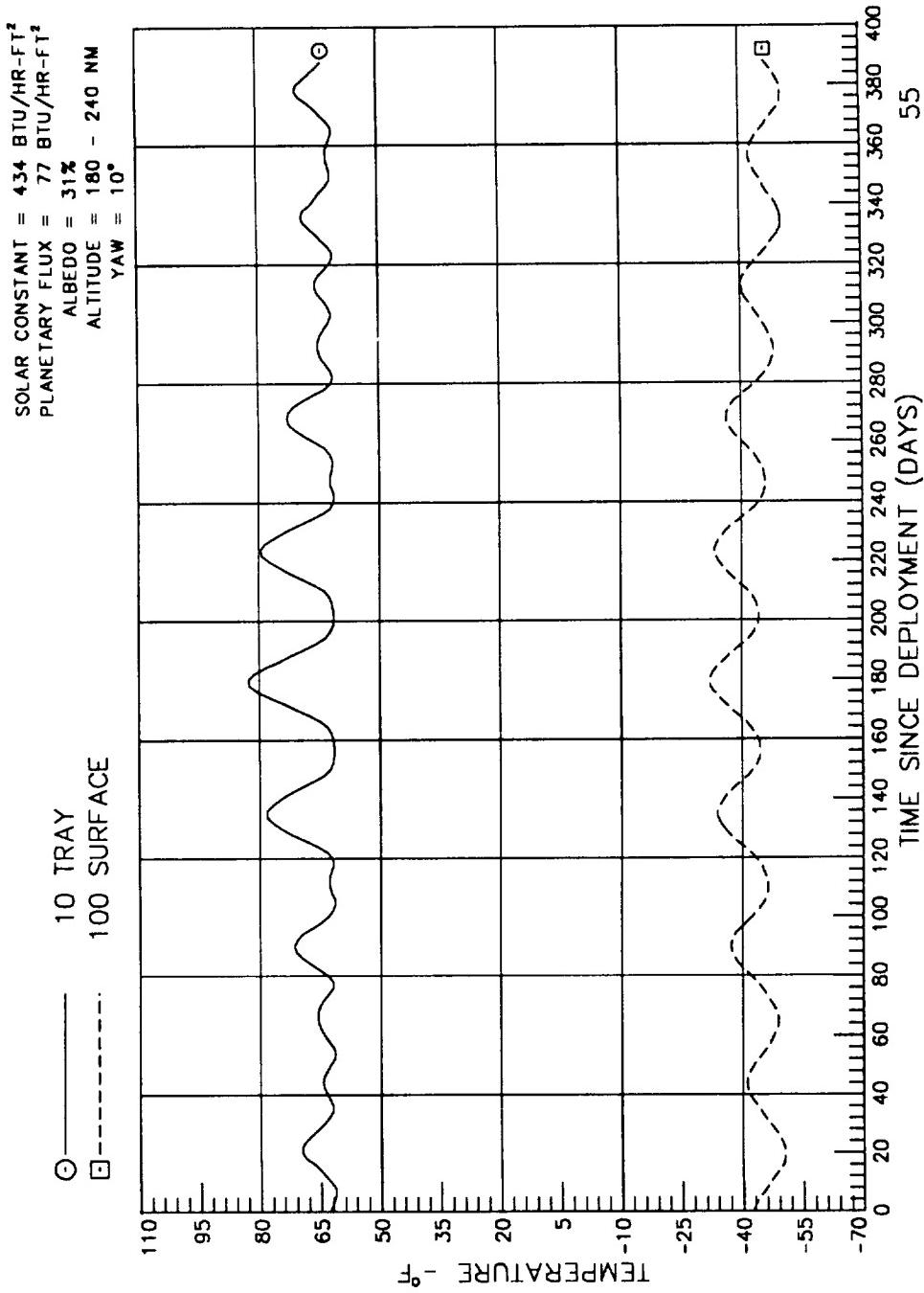
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E9



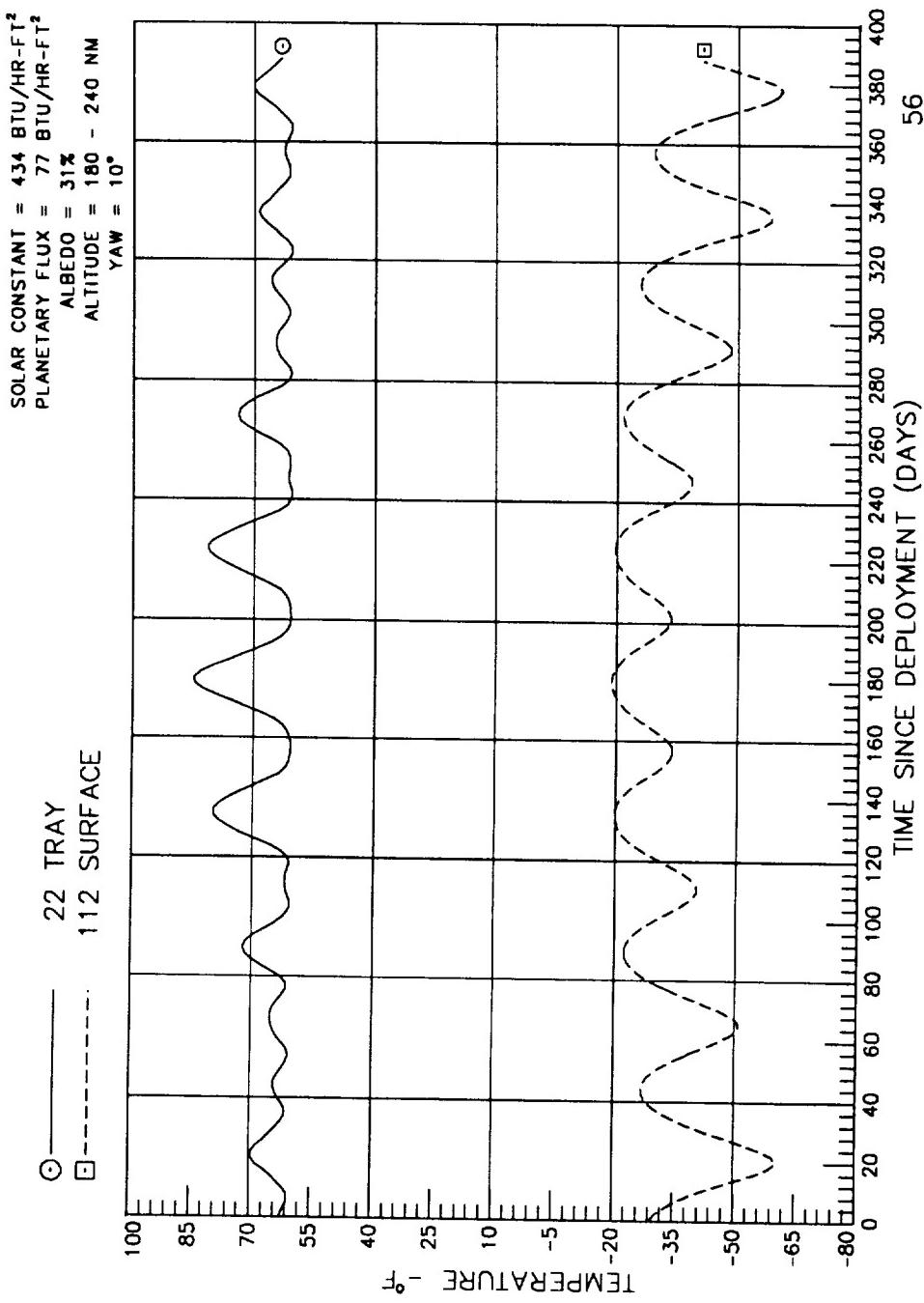
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F9



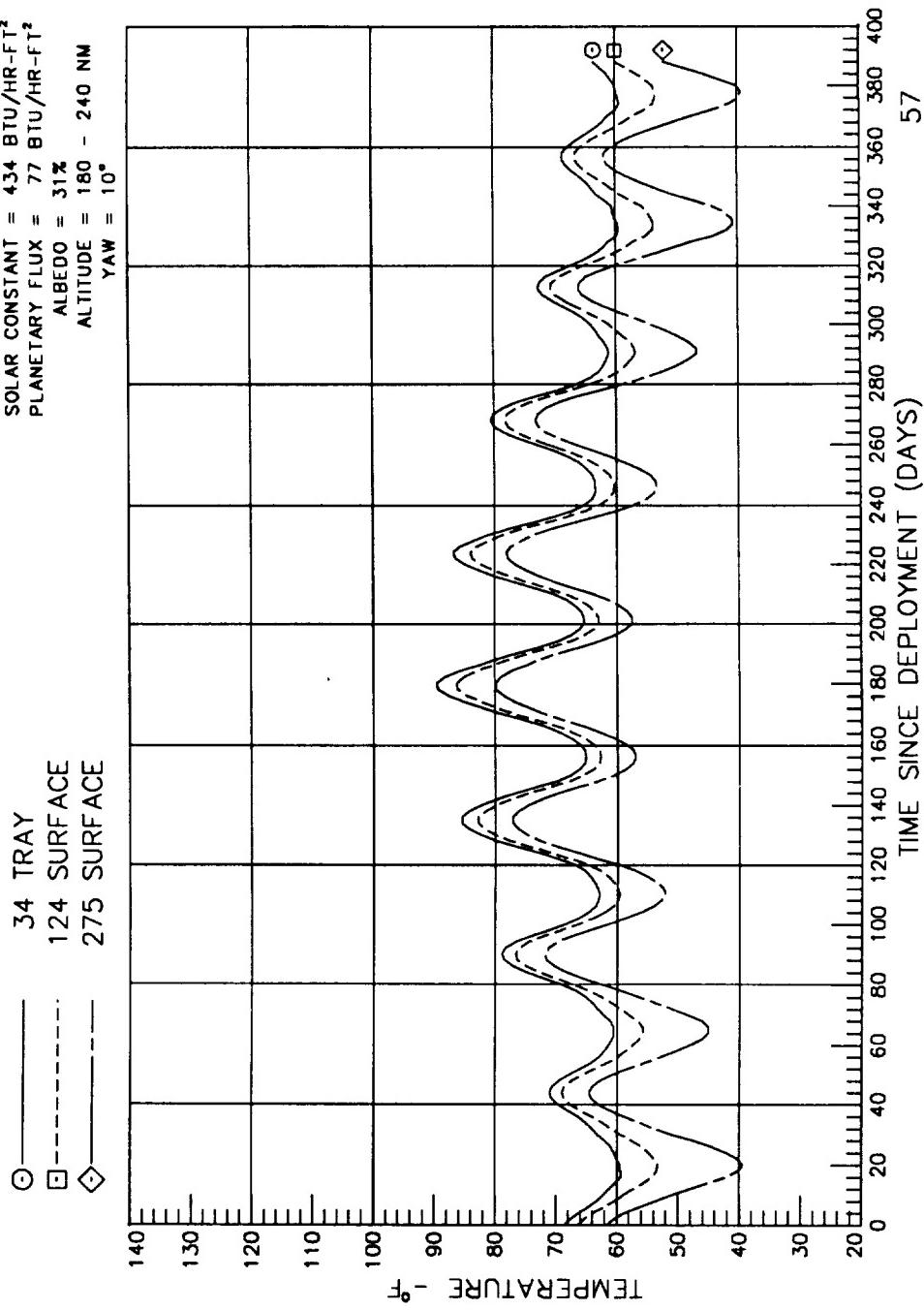
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A10



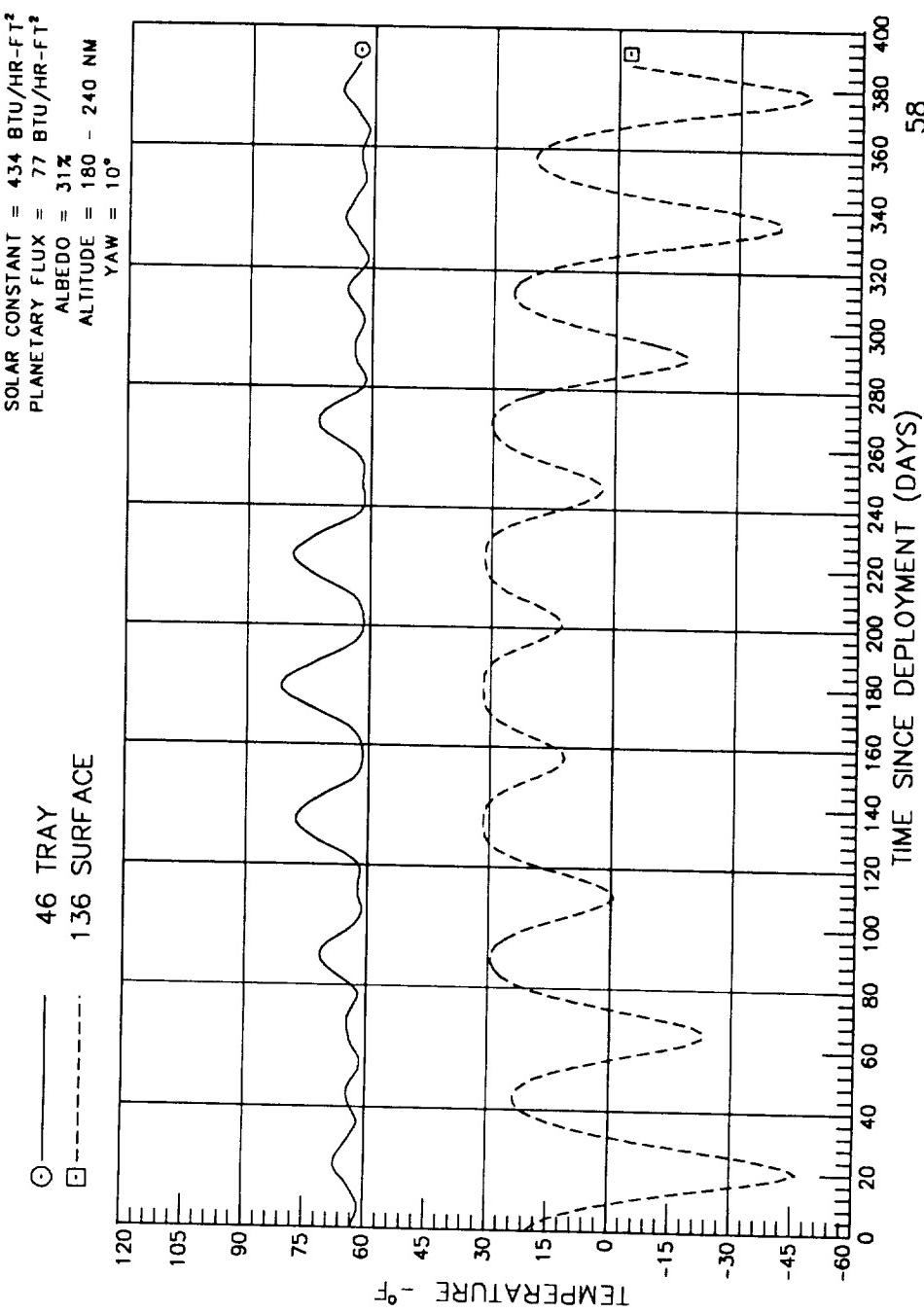
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B10



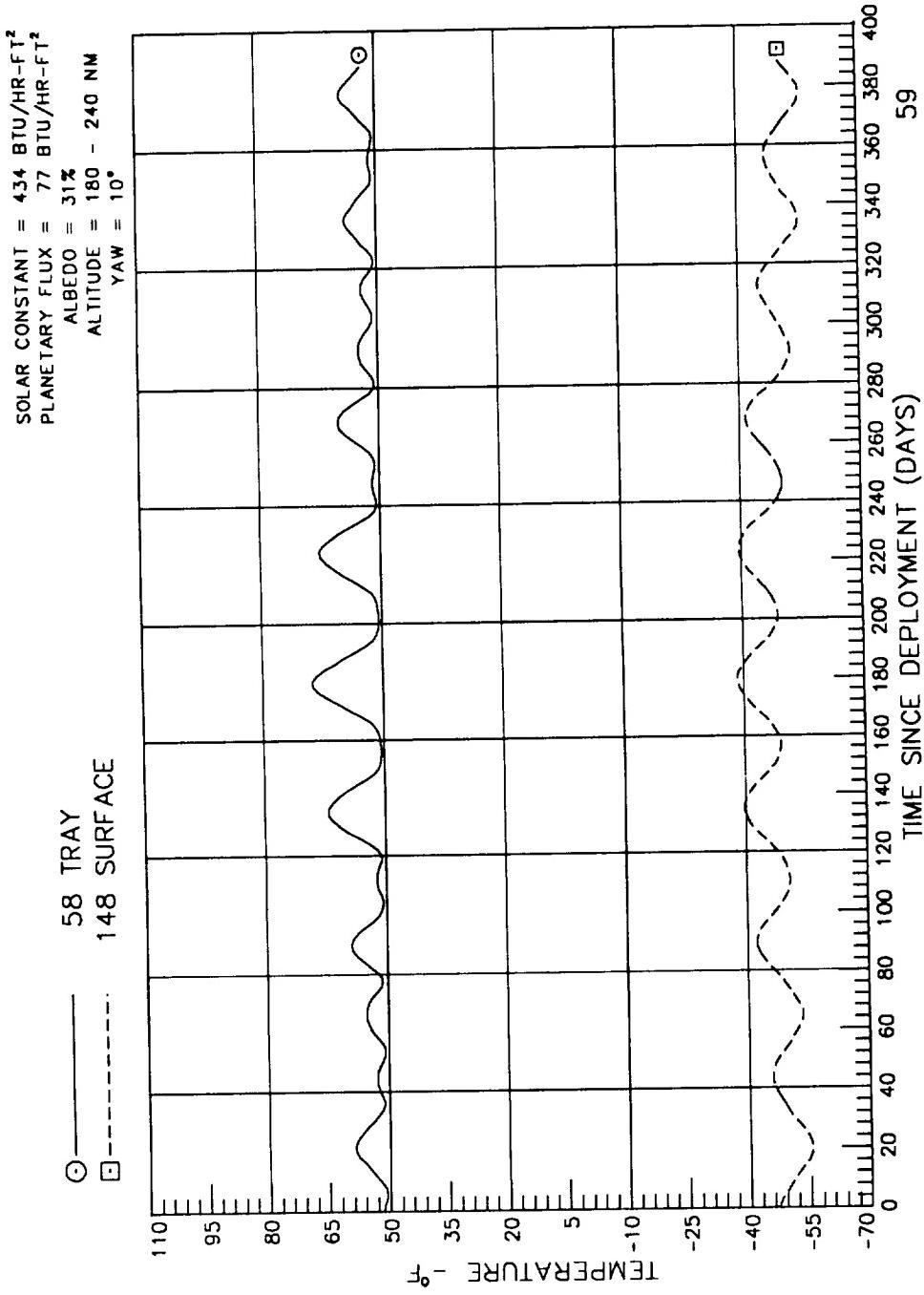
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C10



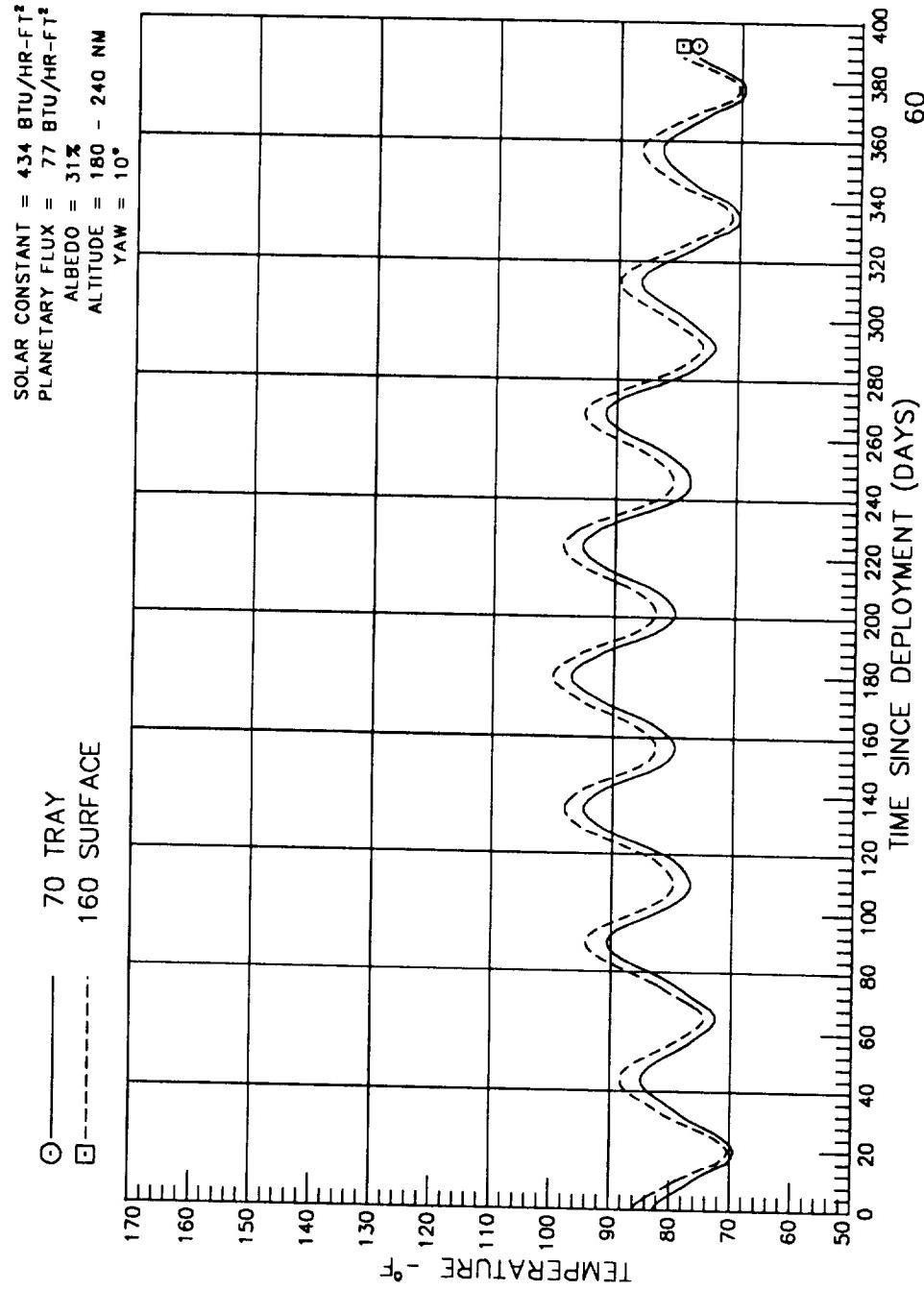
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D10



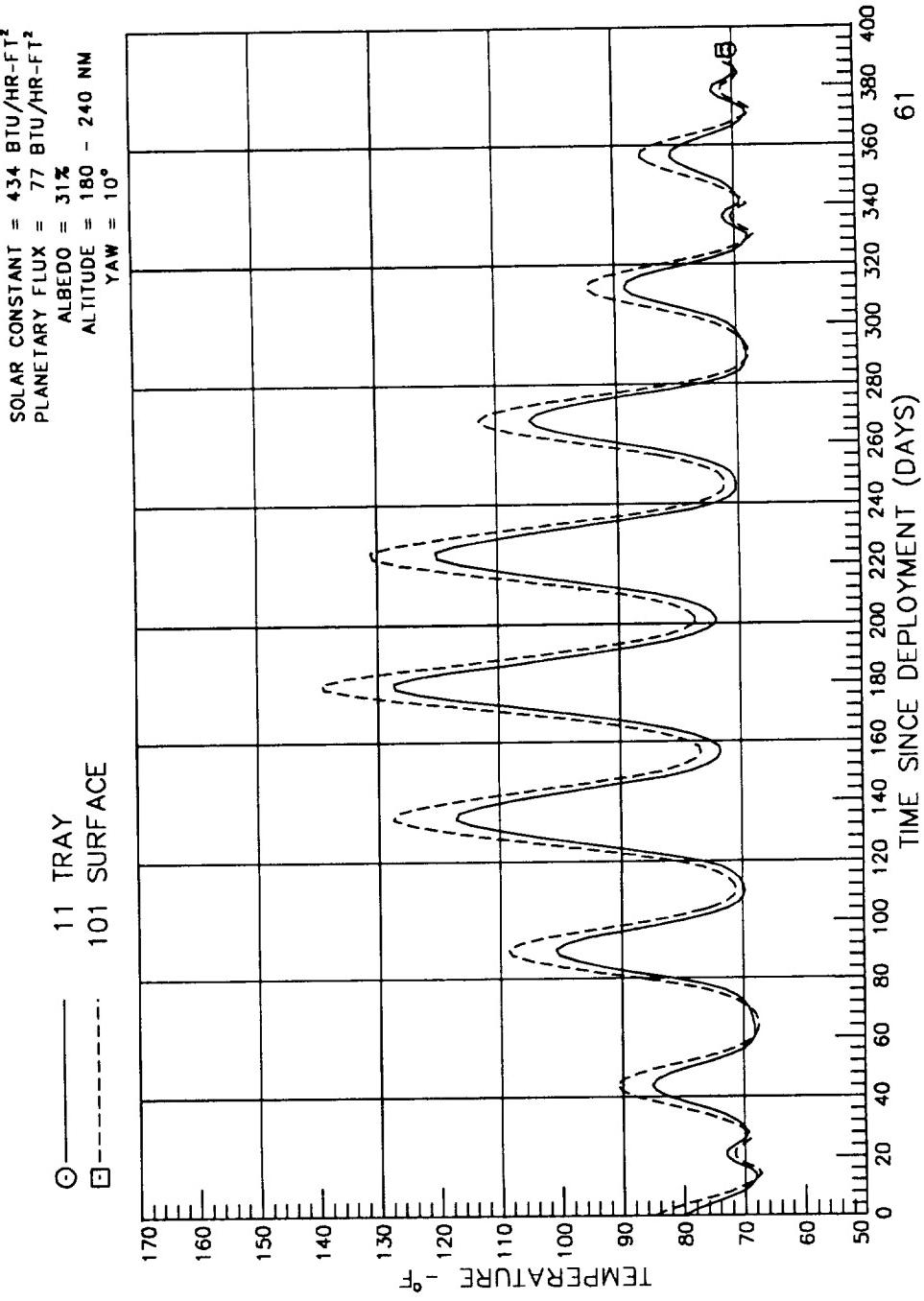
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E10



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F10

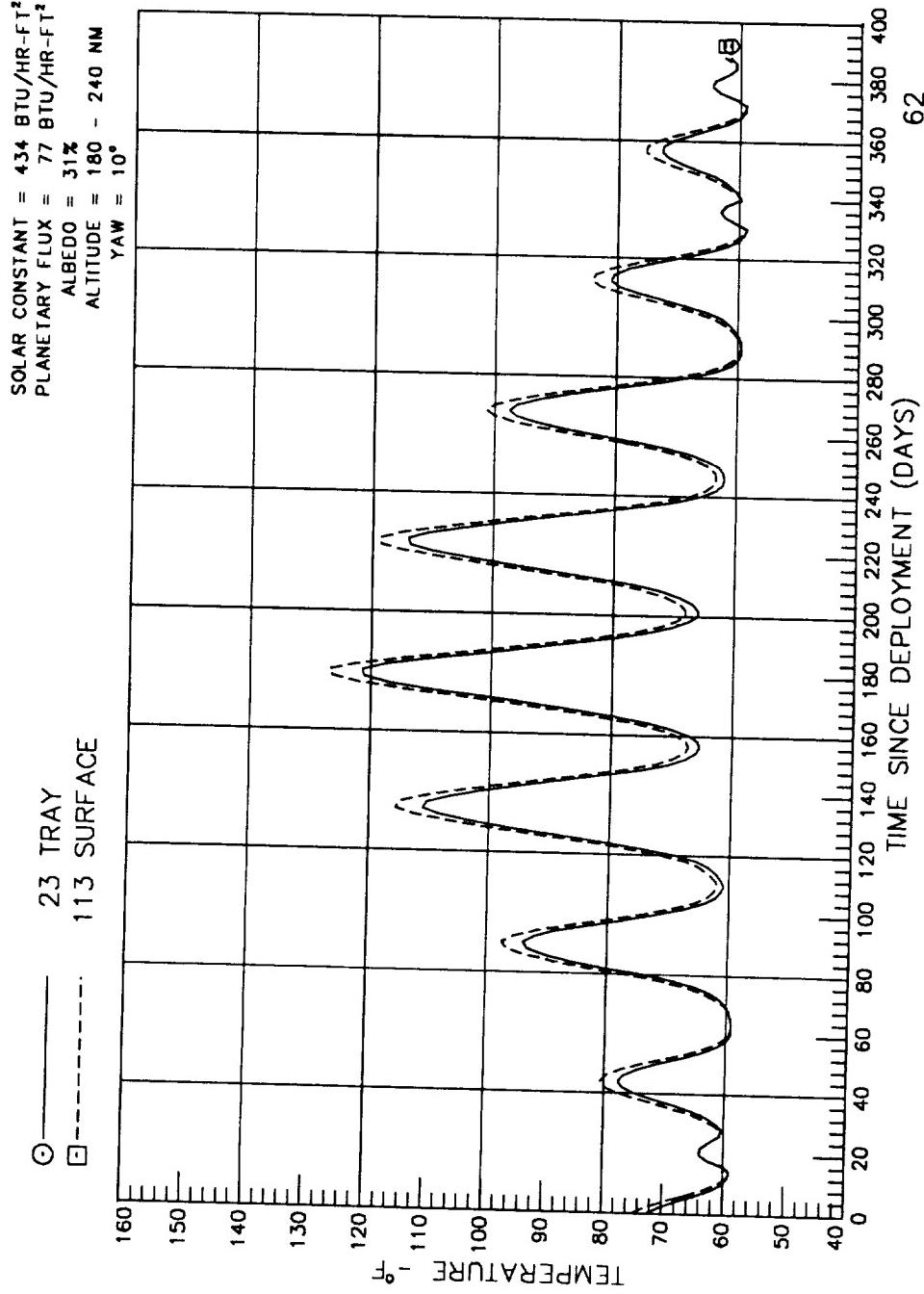


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A11

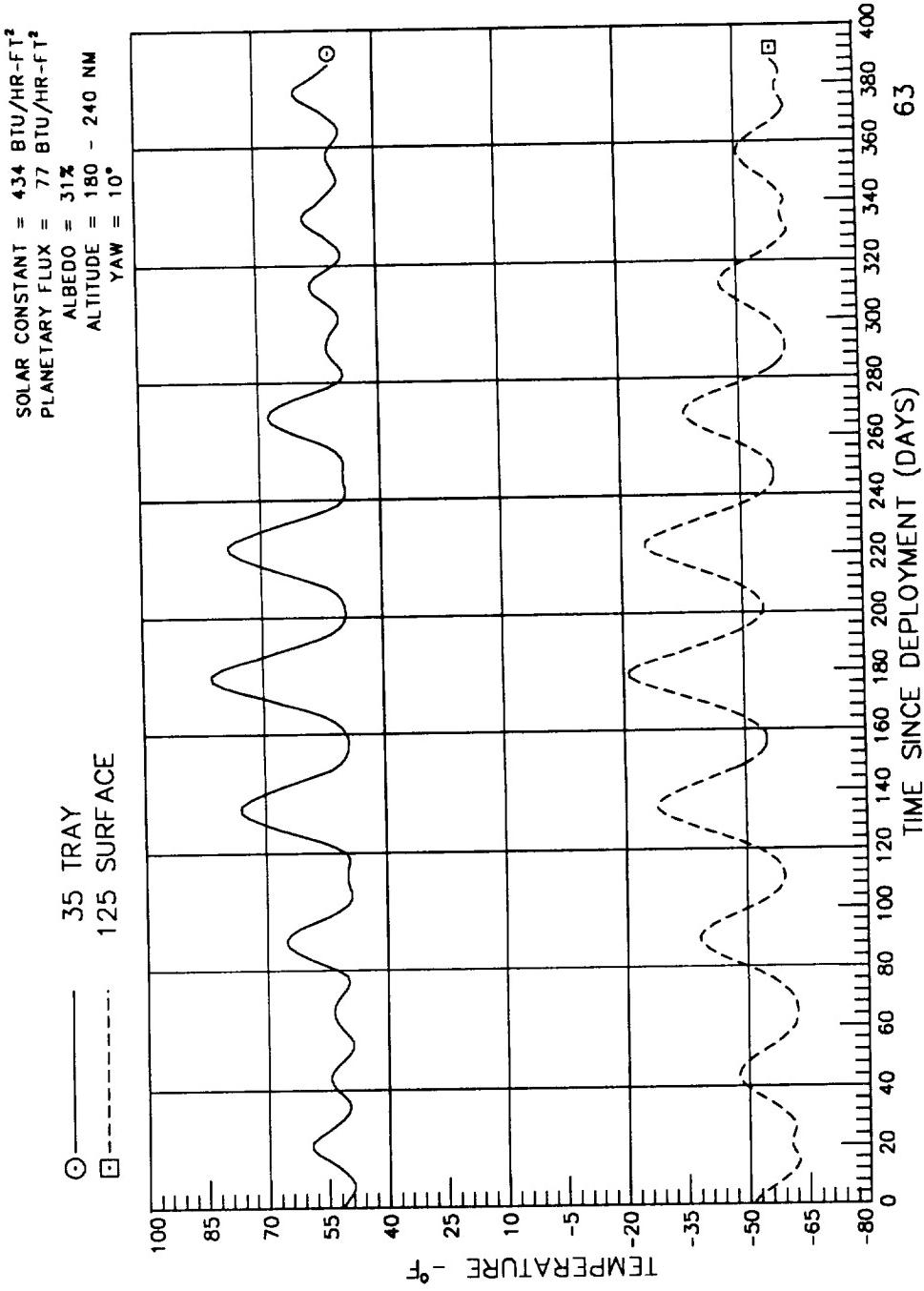


61

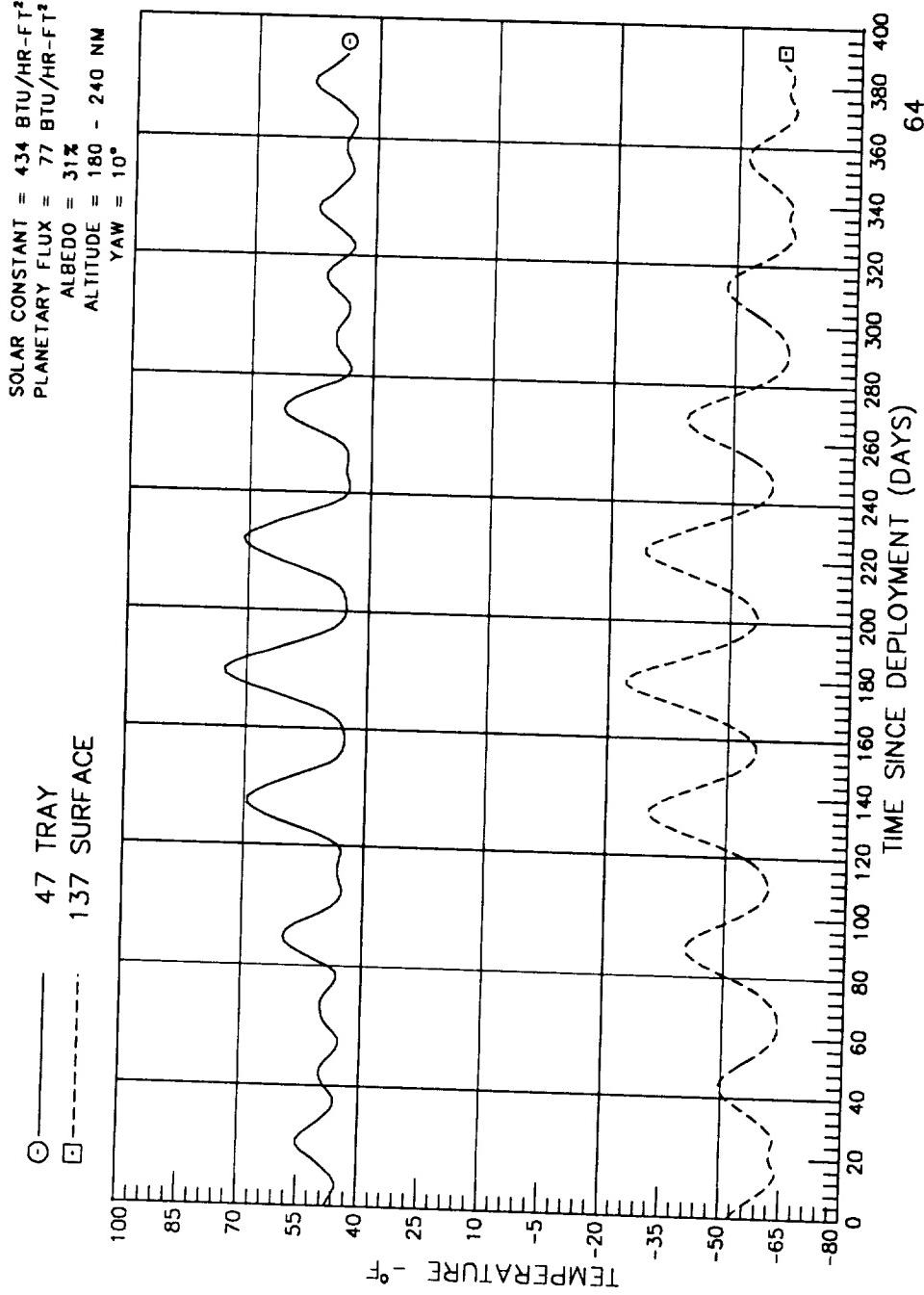
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B11



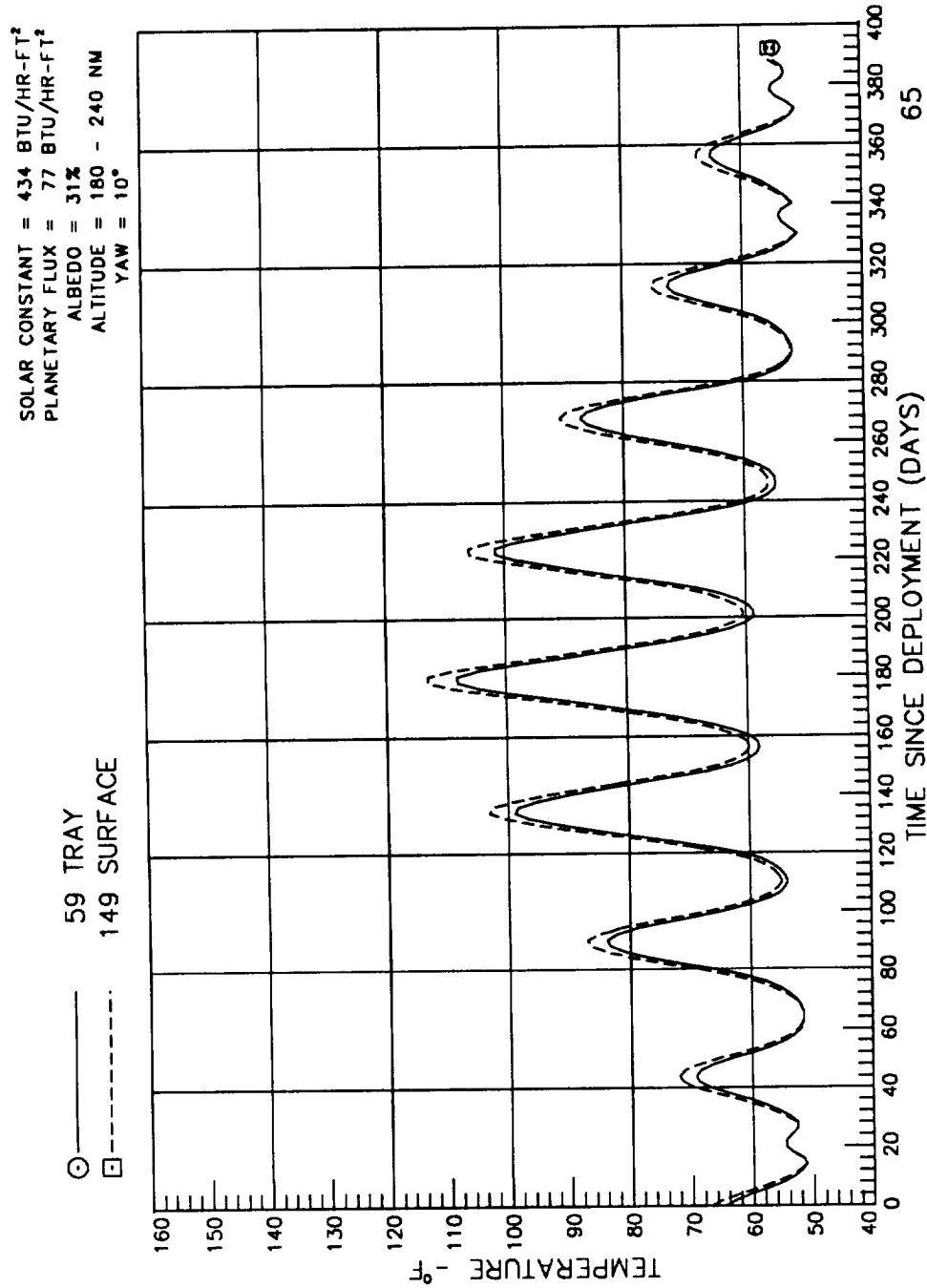
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C11



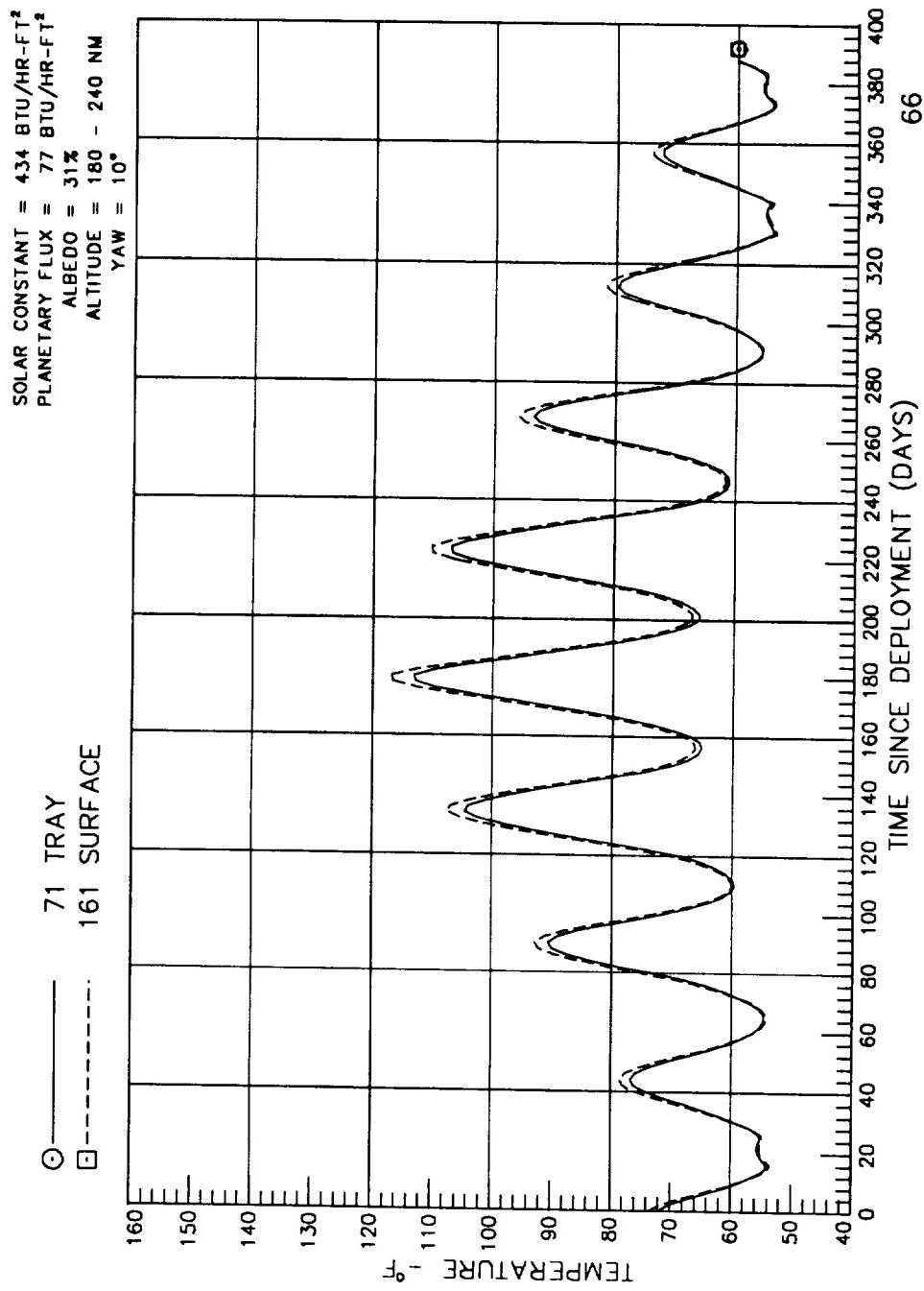
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D11



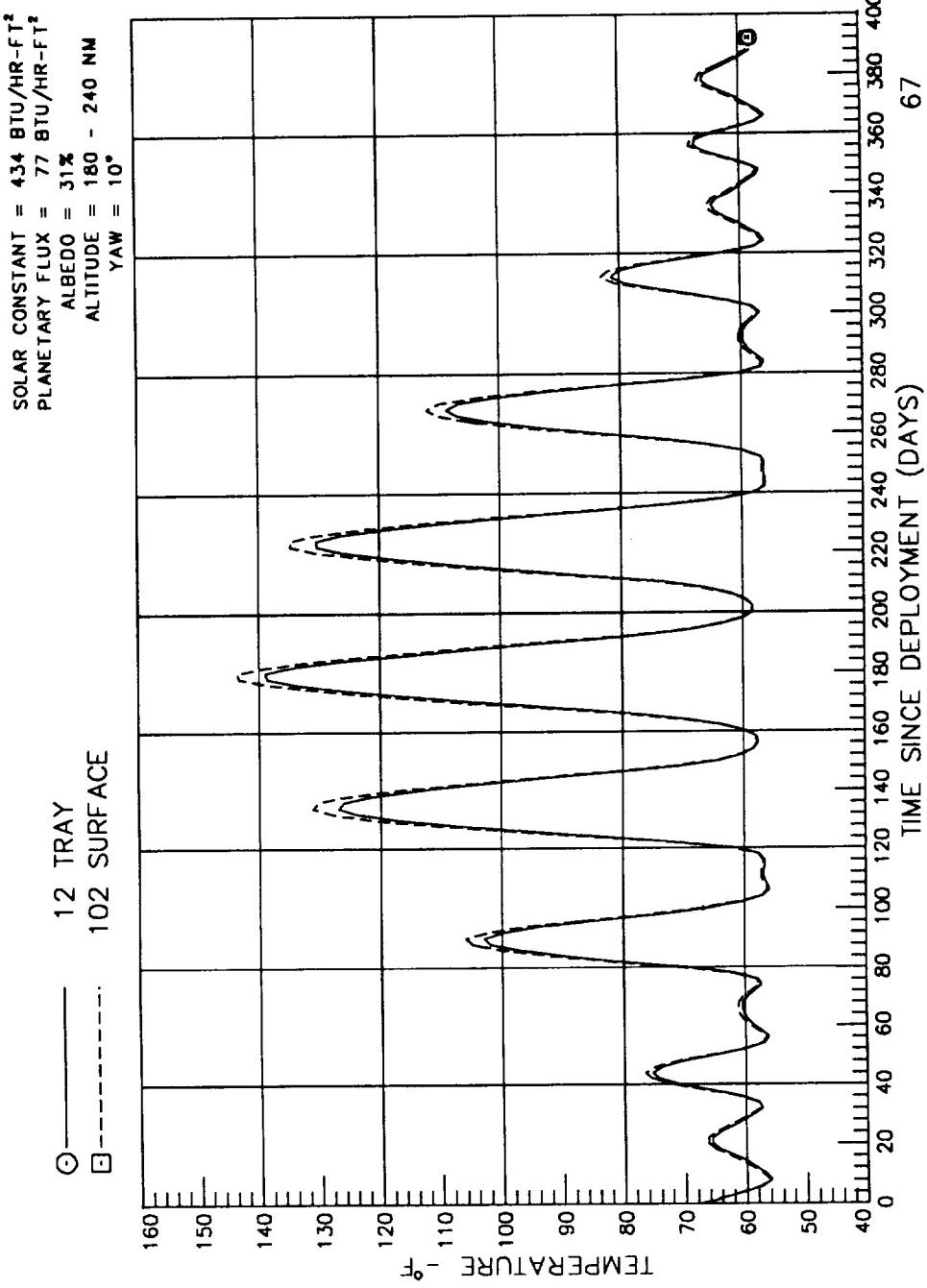
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E11



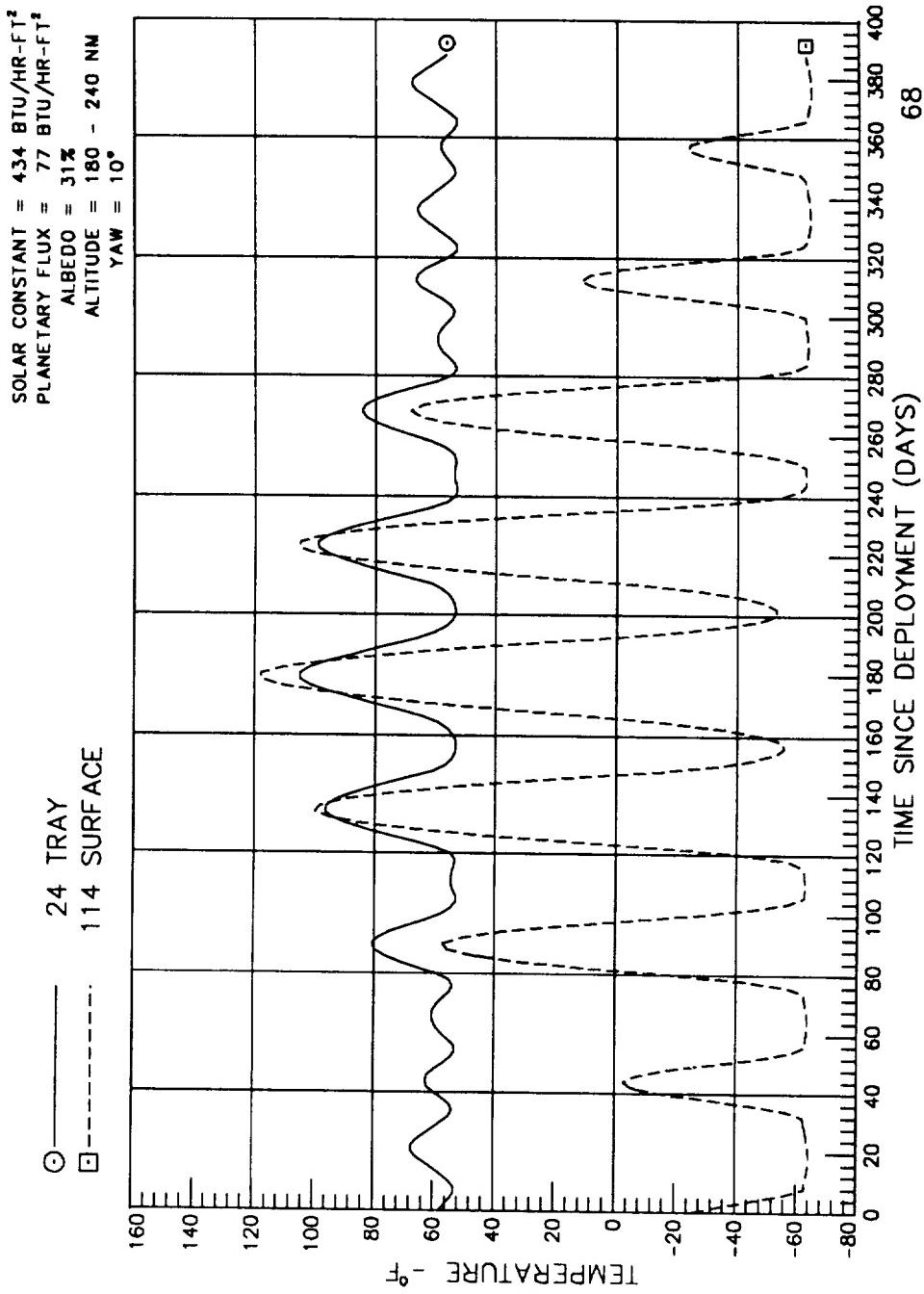
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F11



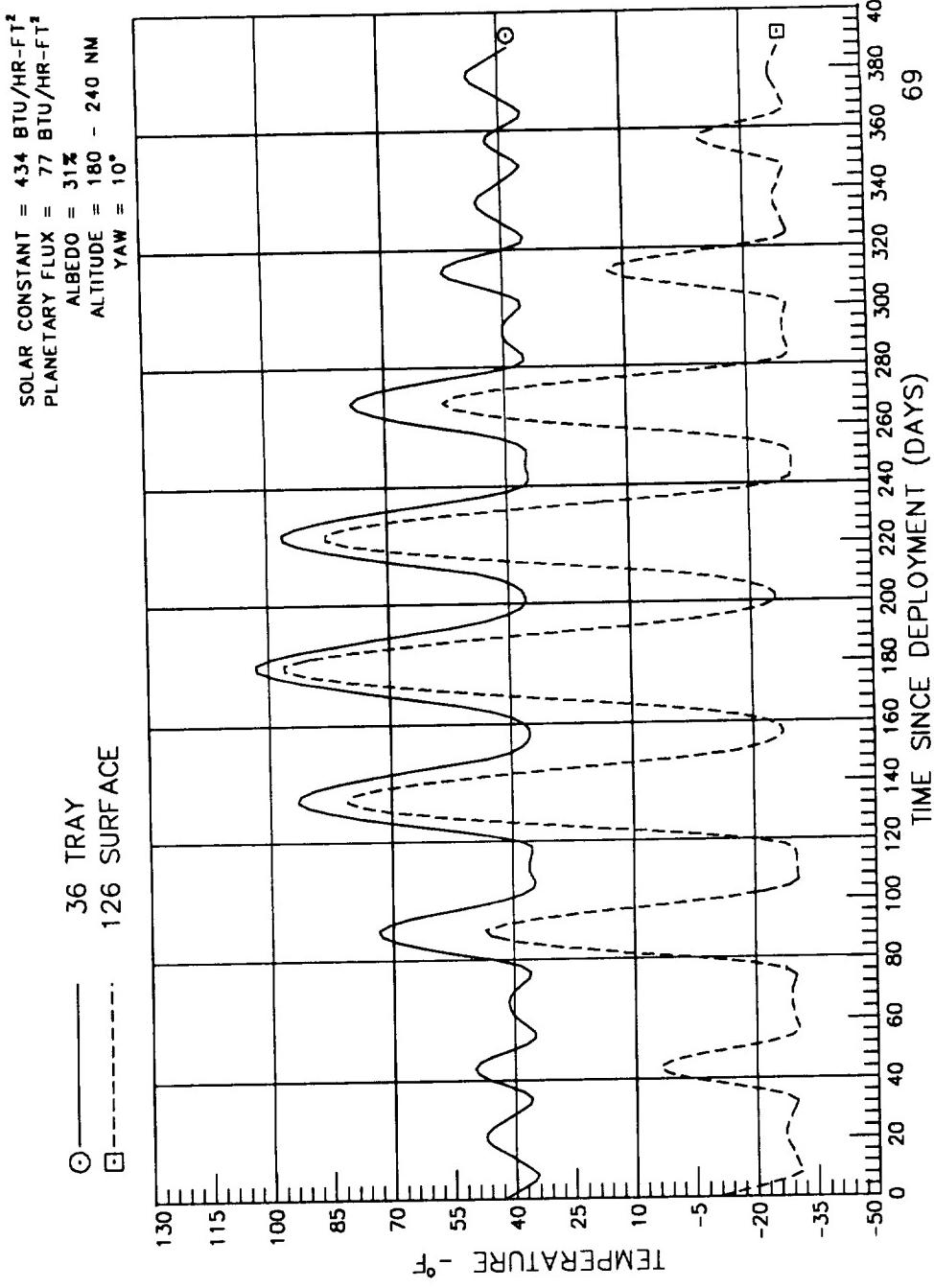
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: A12



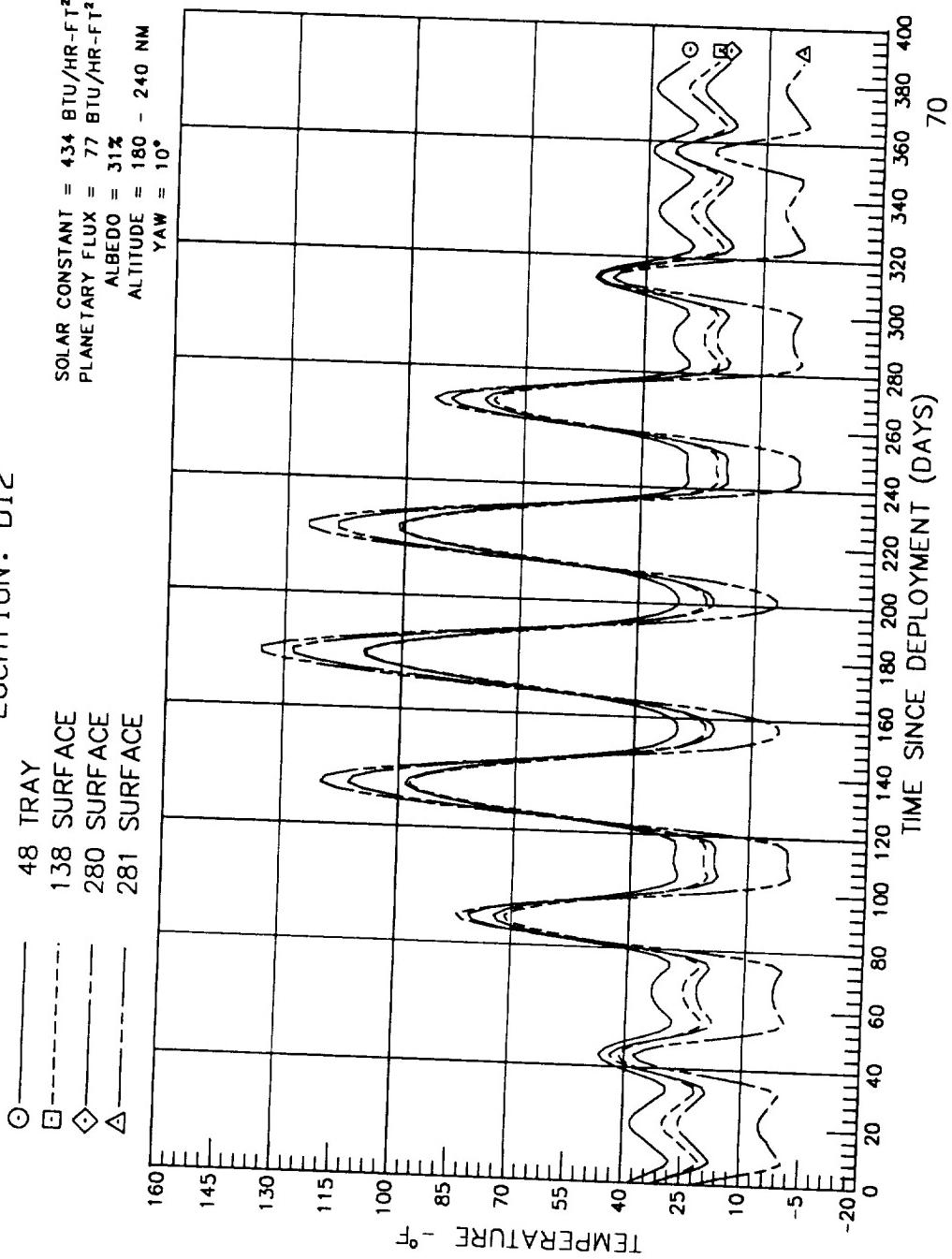
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: B12



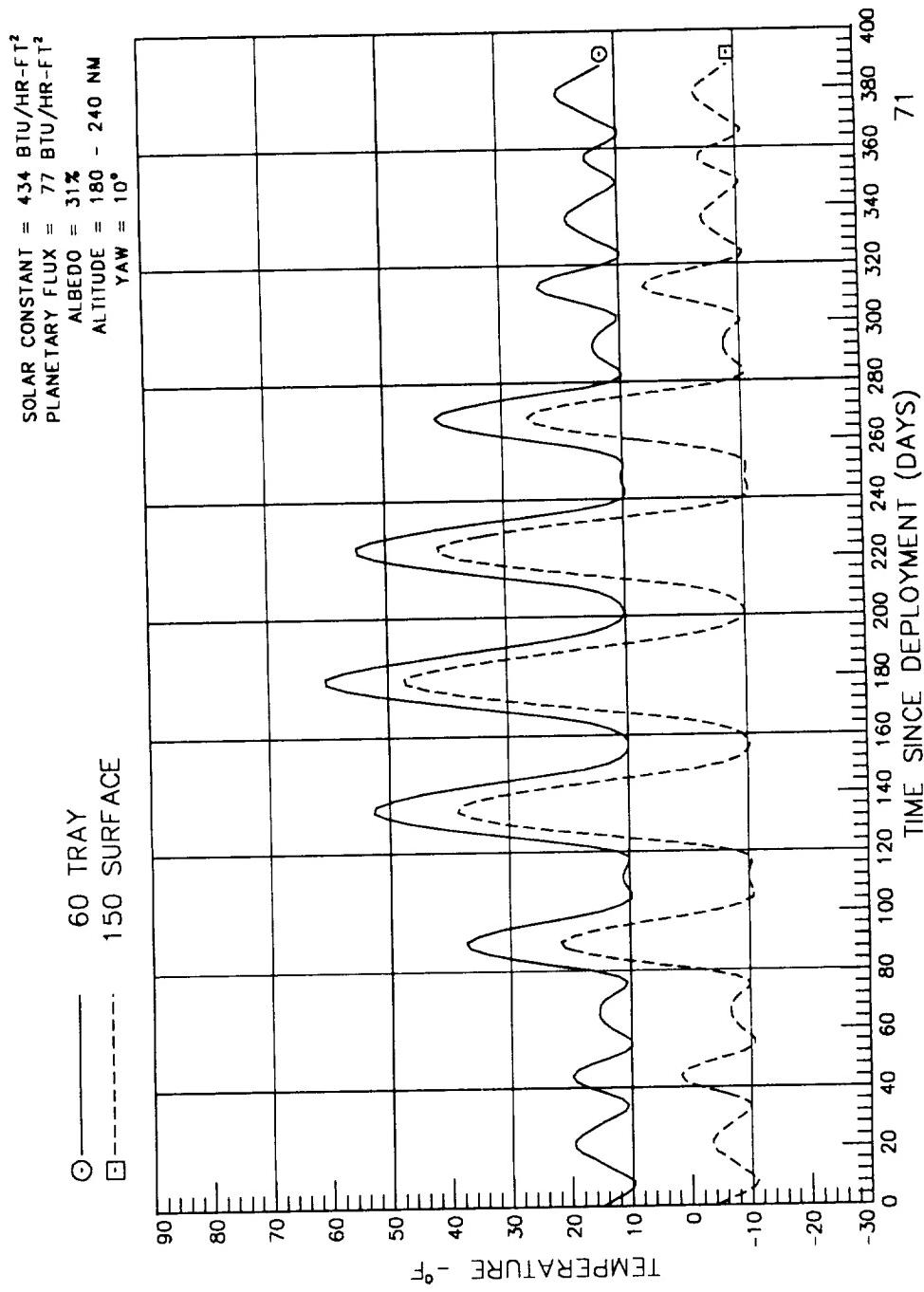
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: C12



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: D12

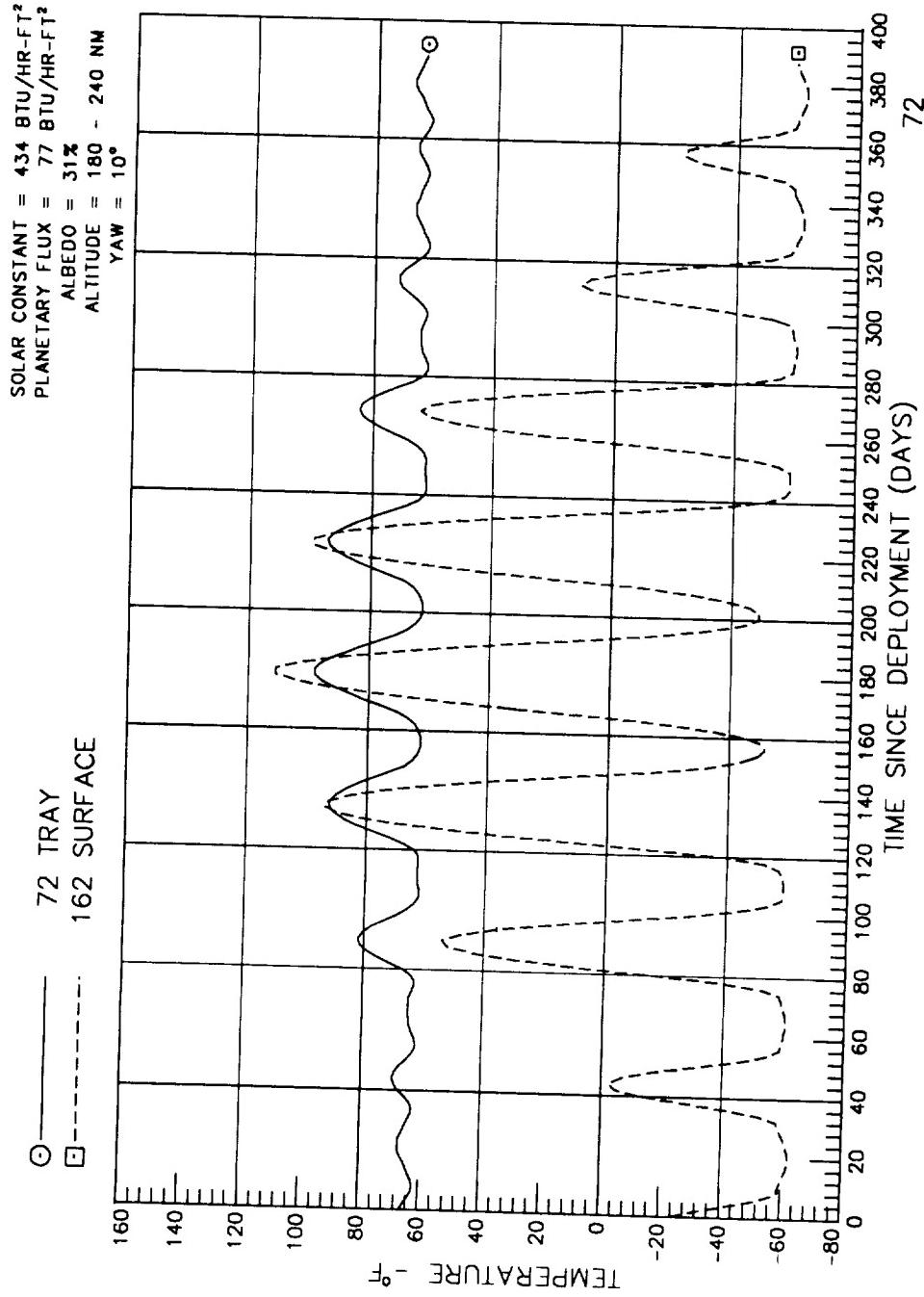


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: E12

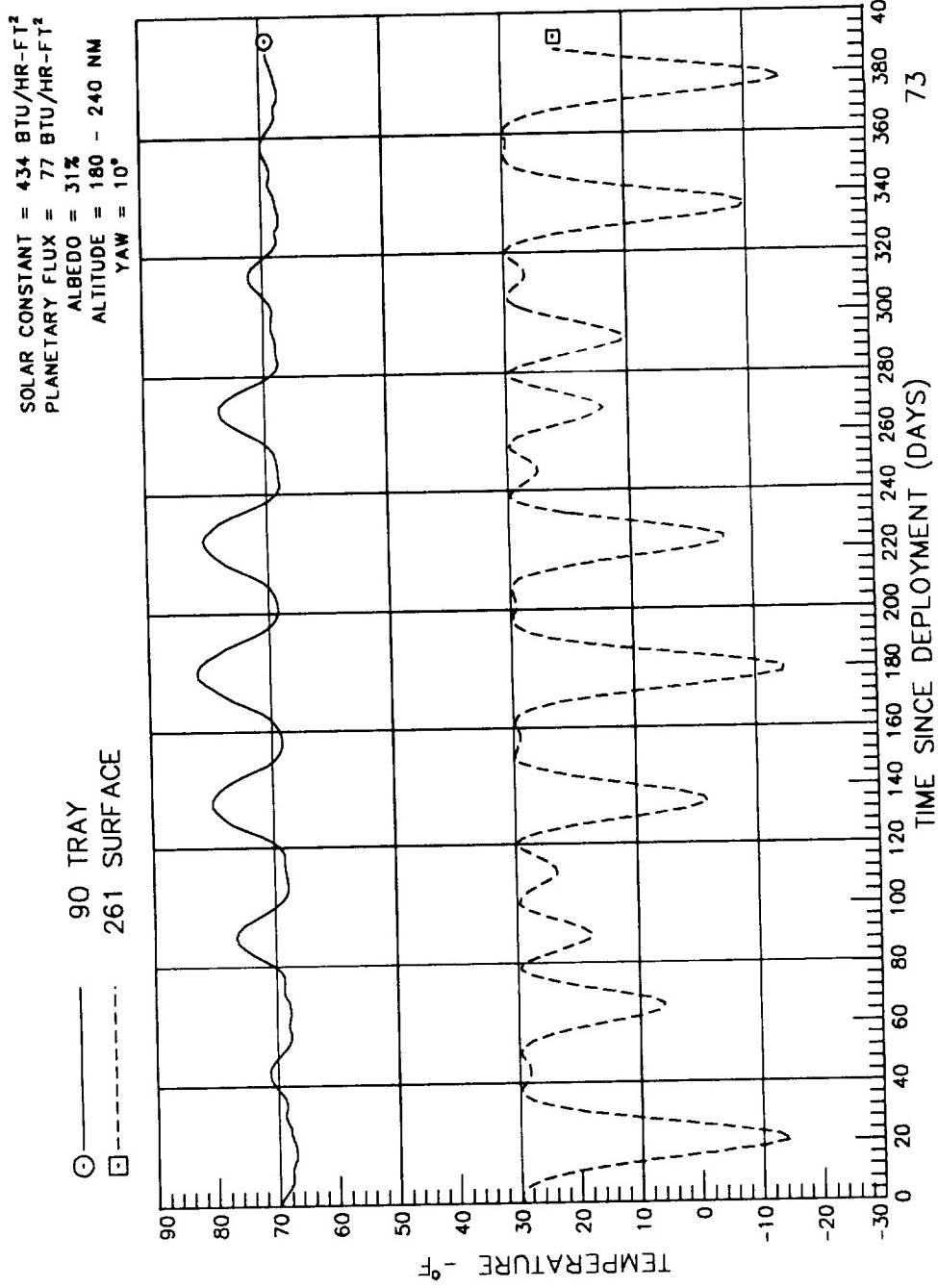


71

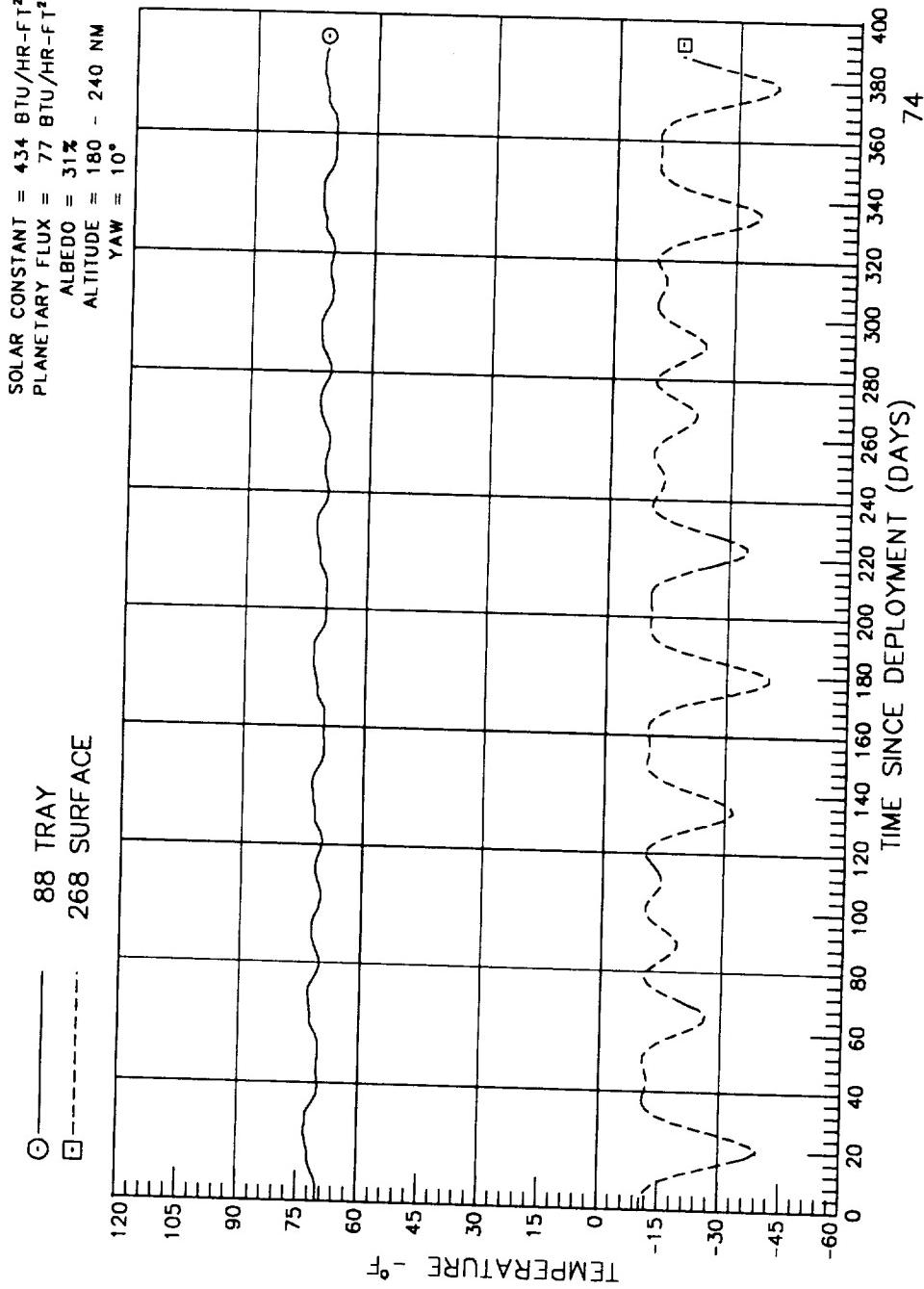
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: F12



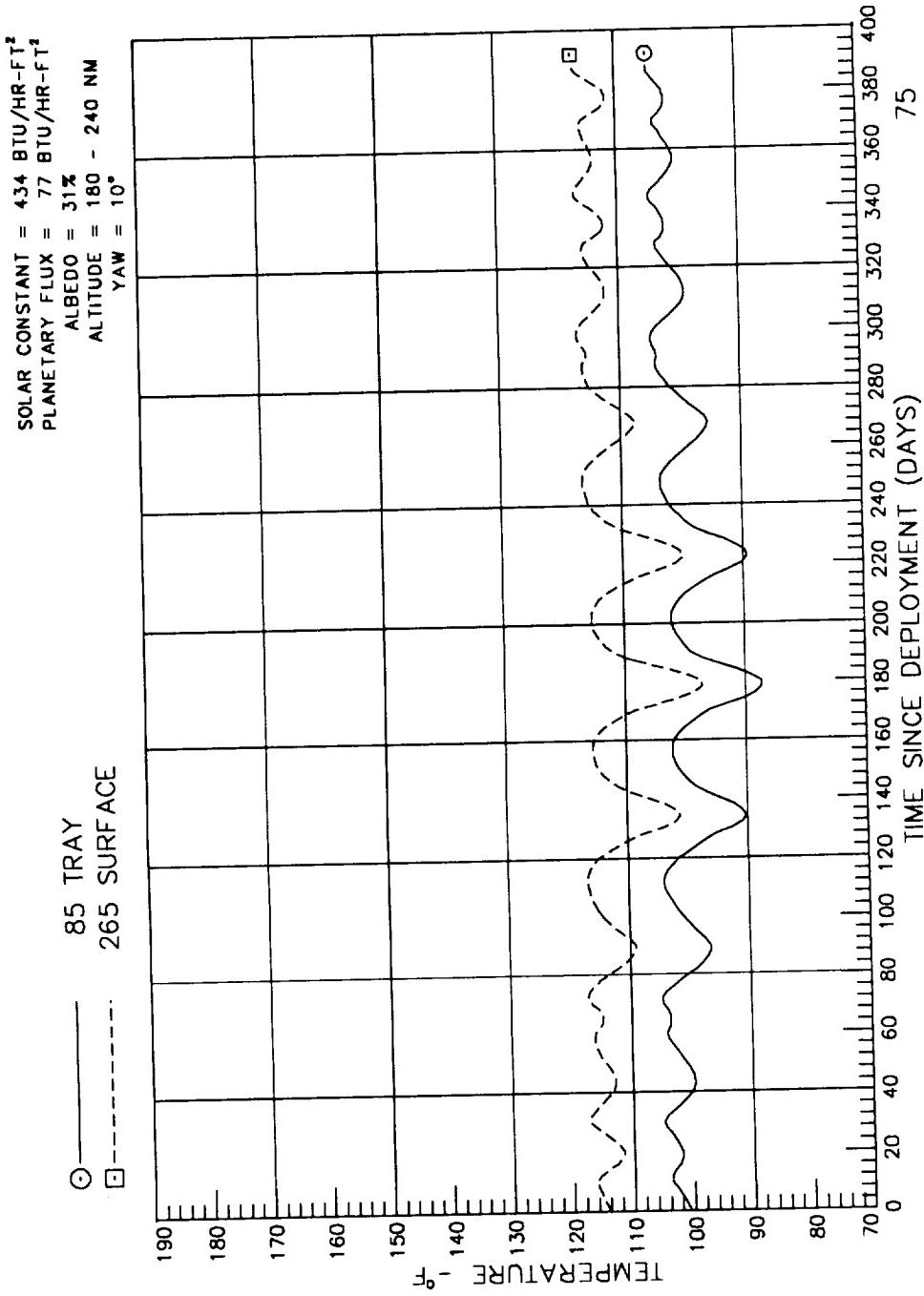
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
LOCATION: H1



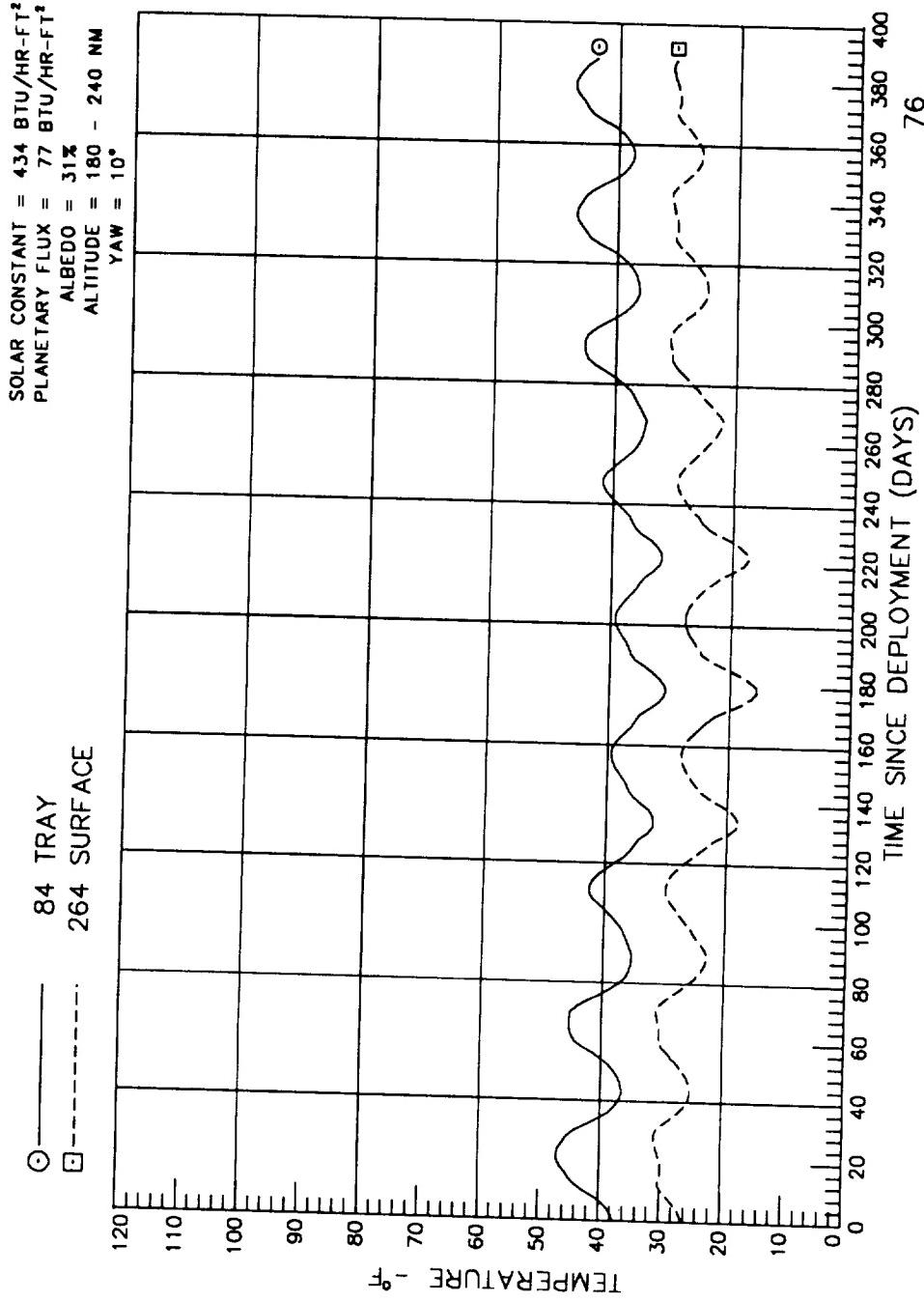
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H3



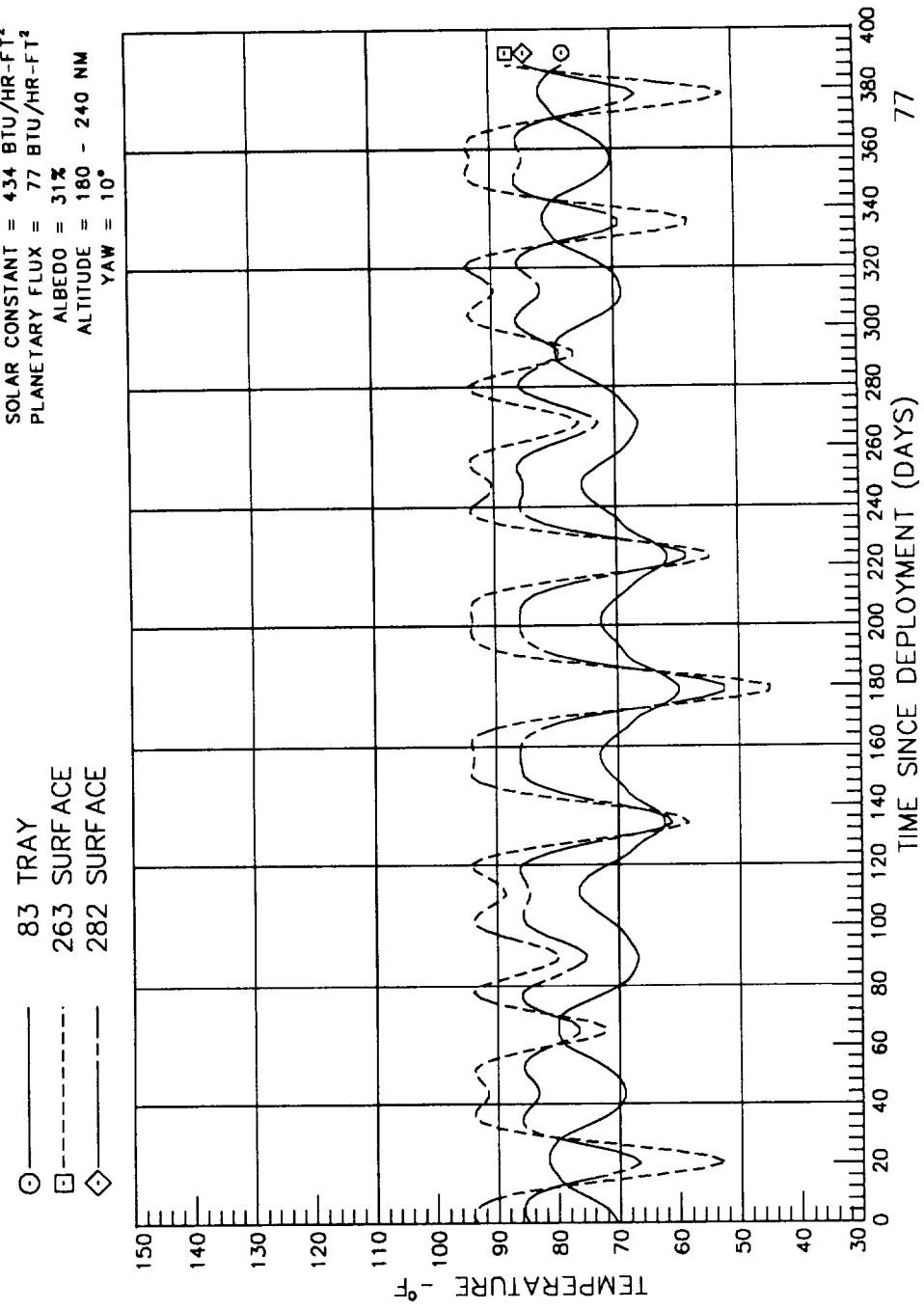
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H5



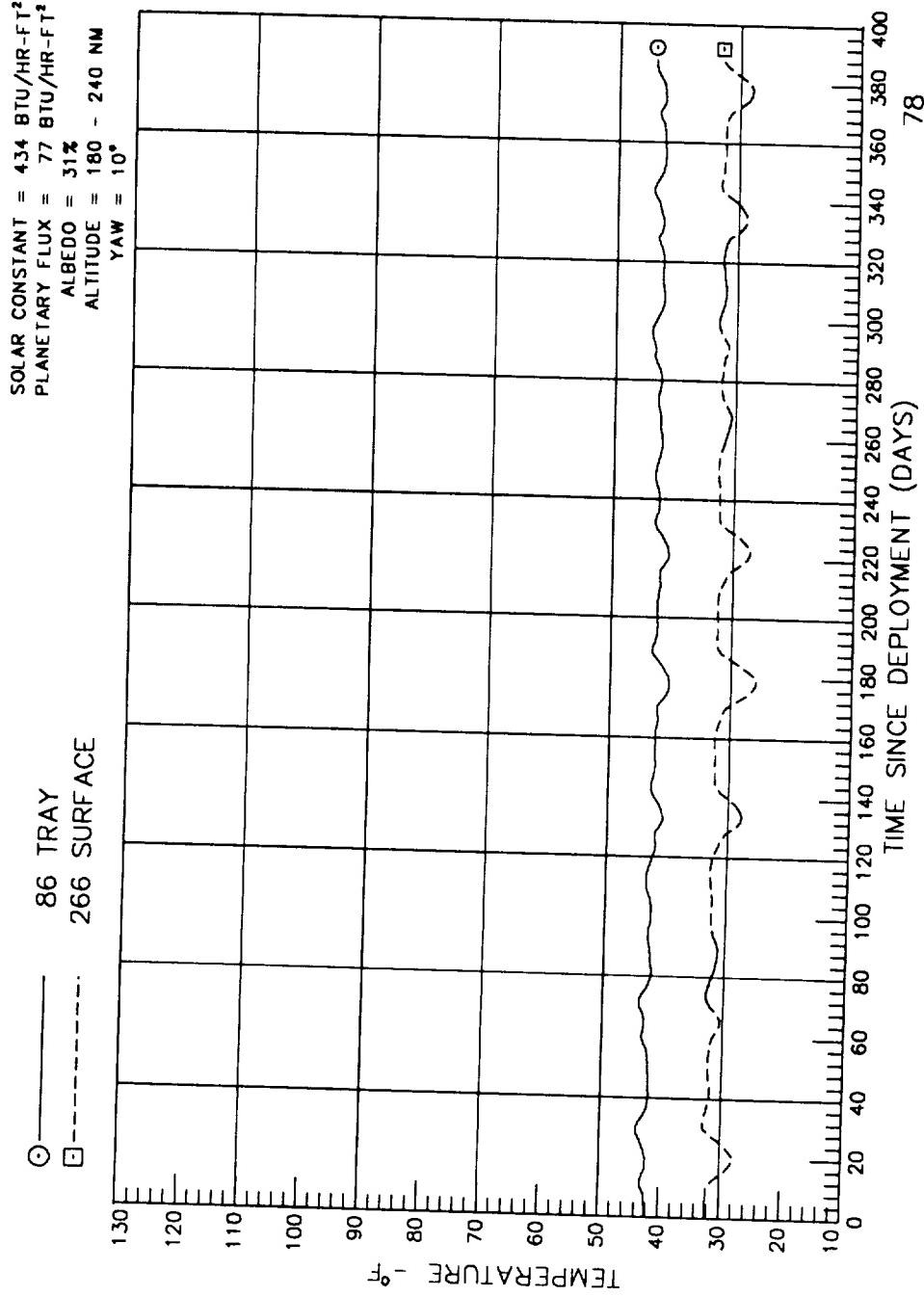
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H6



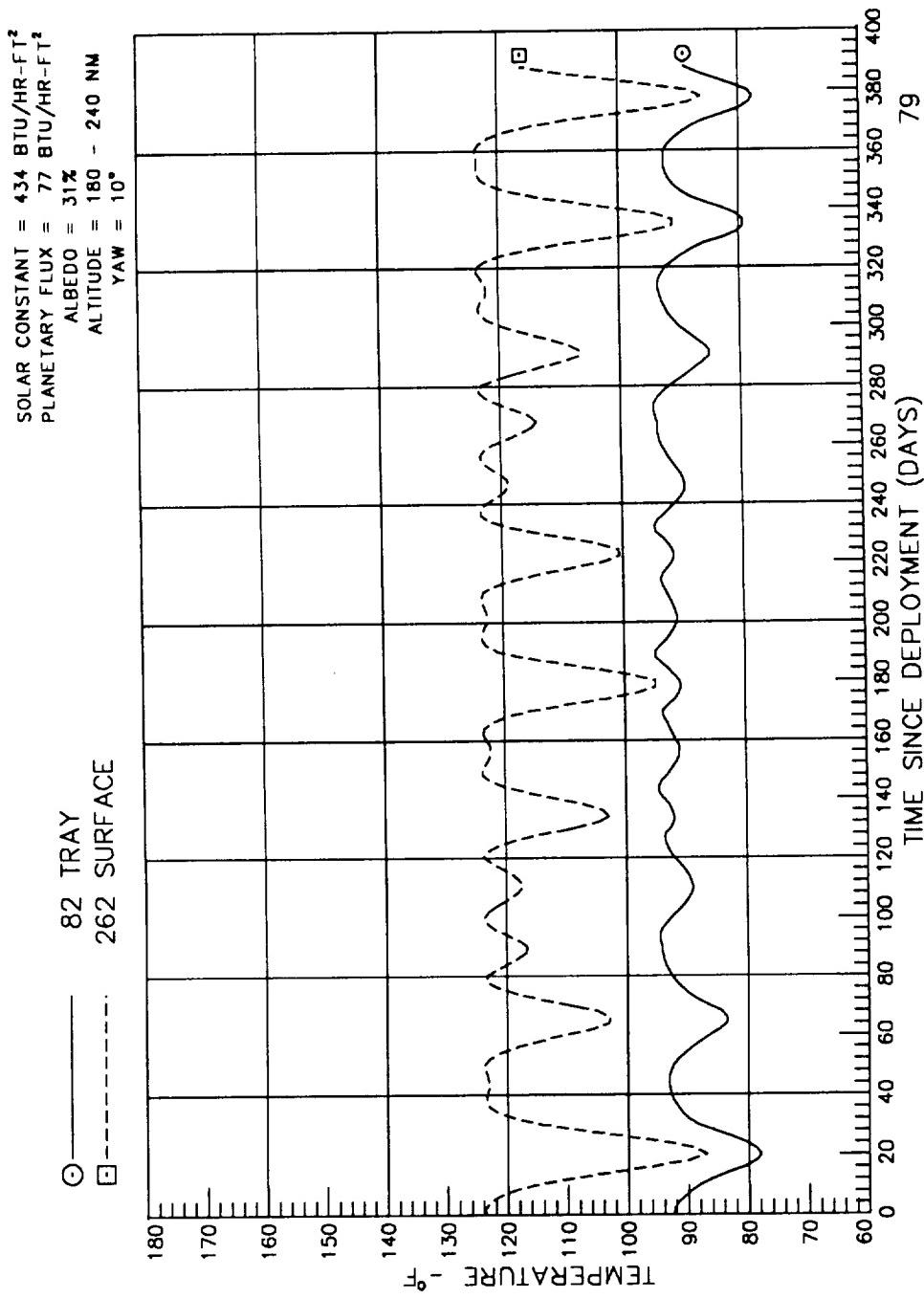
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H7



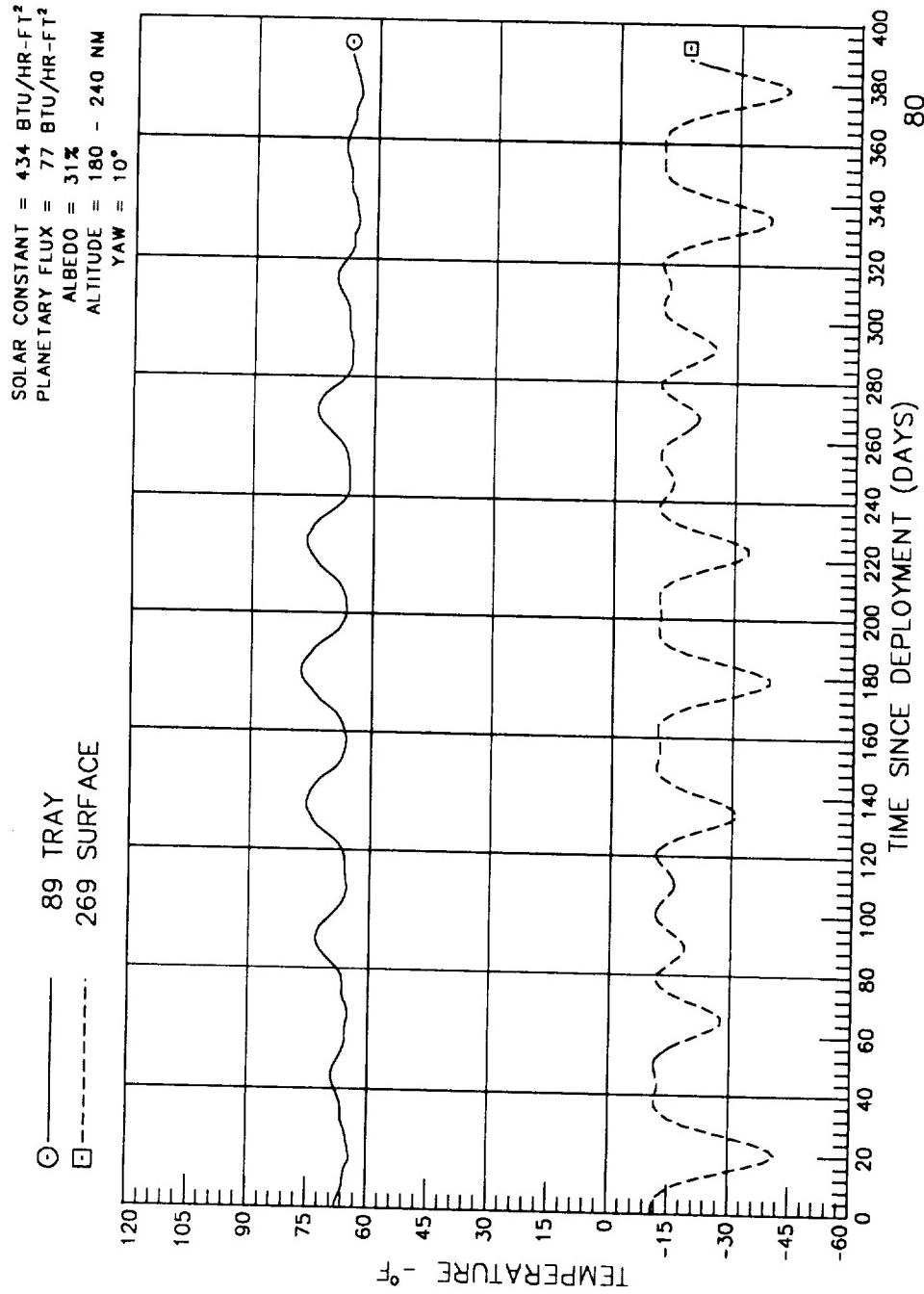
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H9



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H11



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: H12

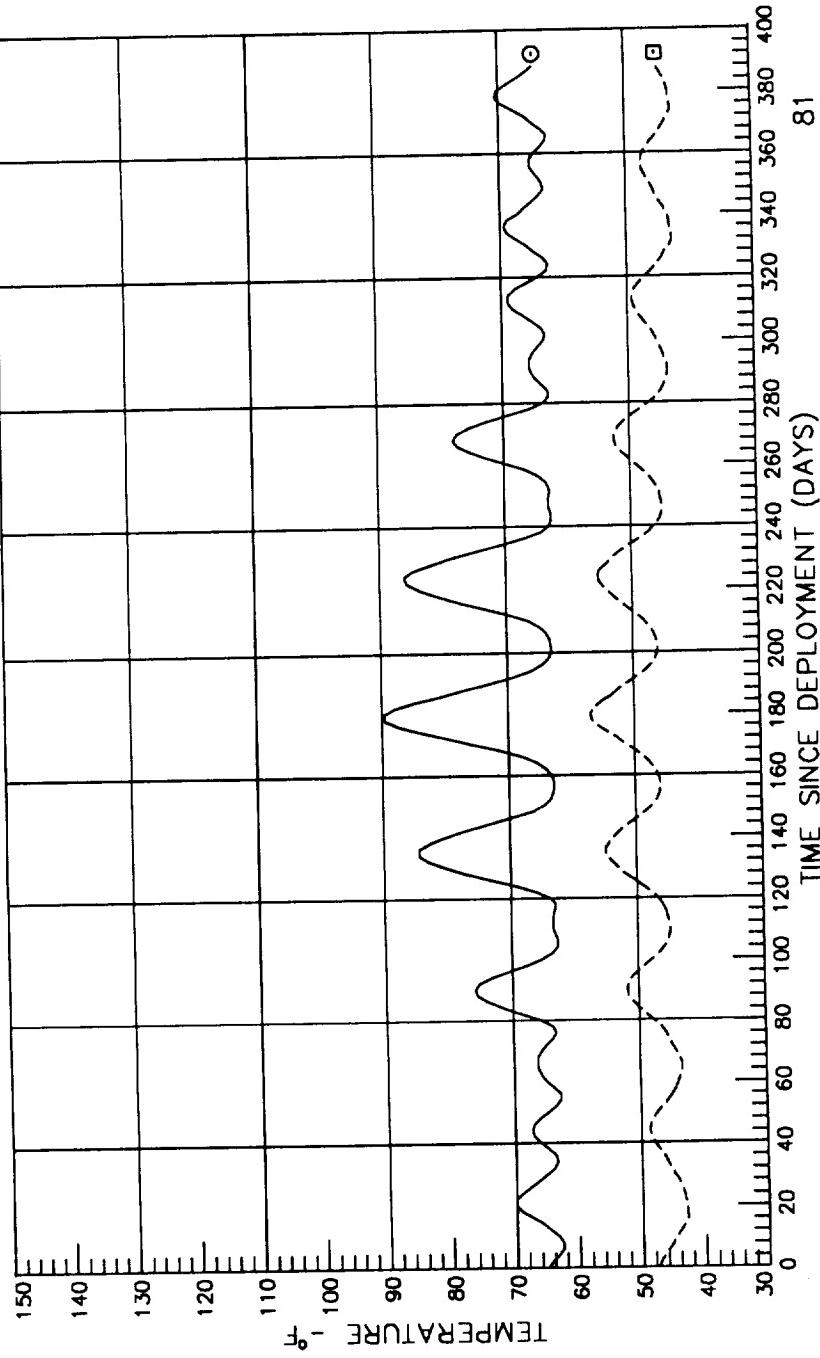


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: G2

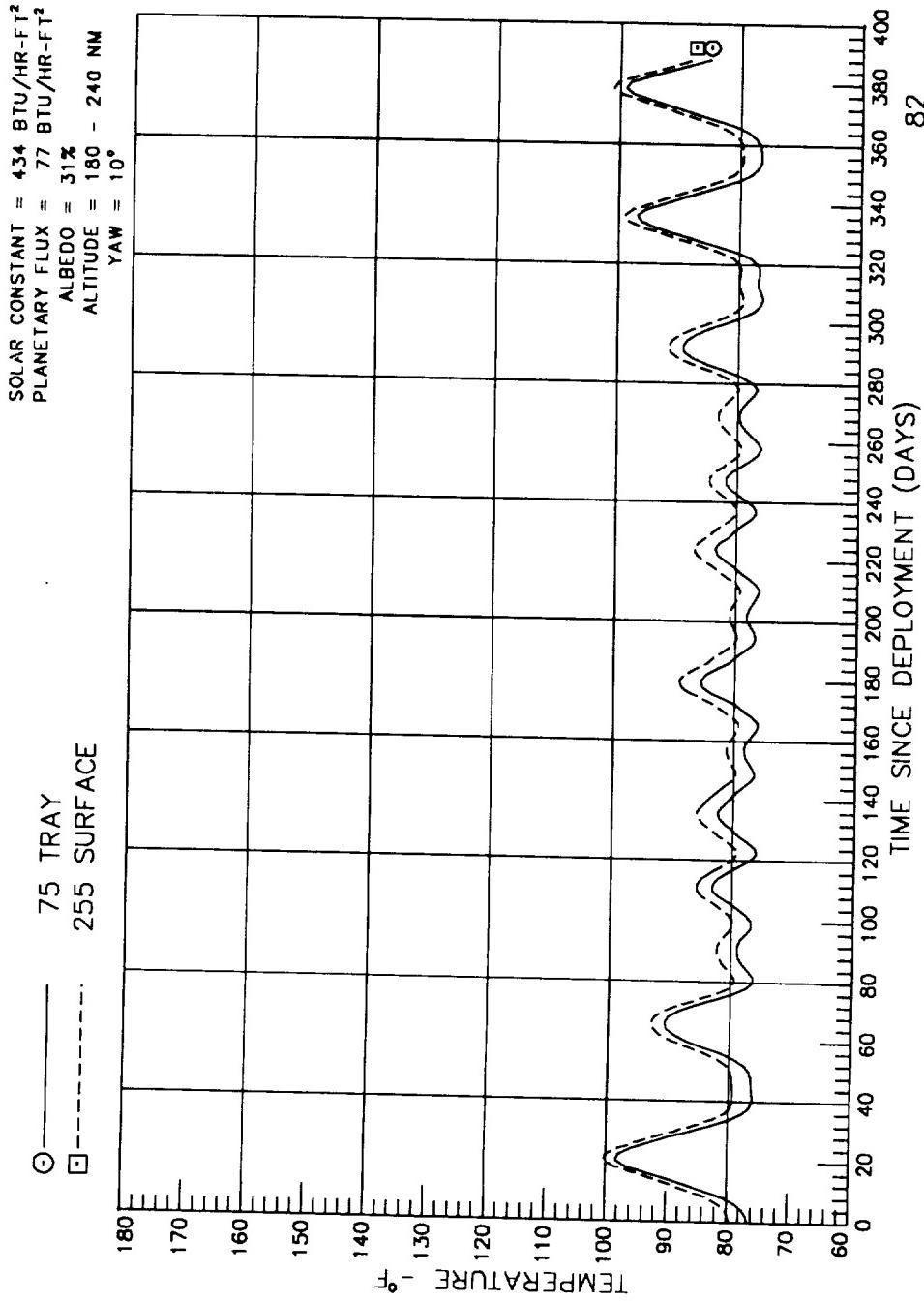
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

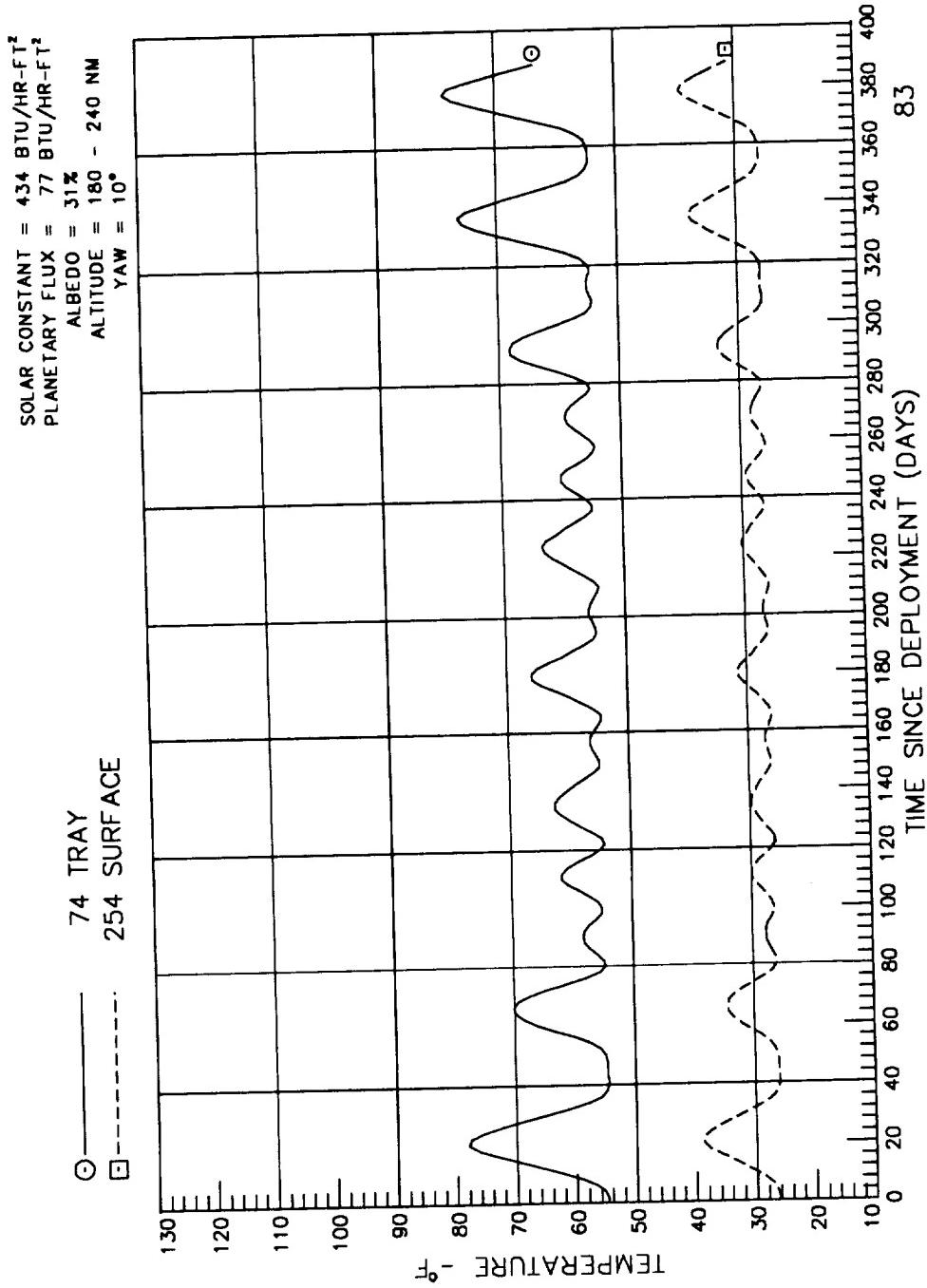
○ --- 81 TRAY
 - - - 252 SURFACE



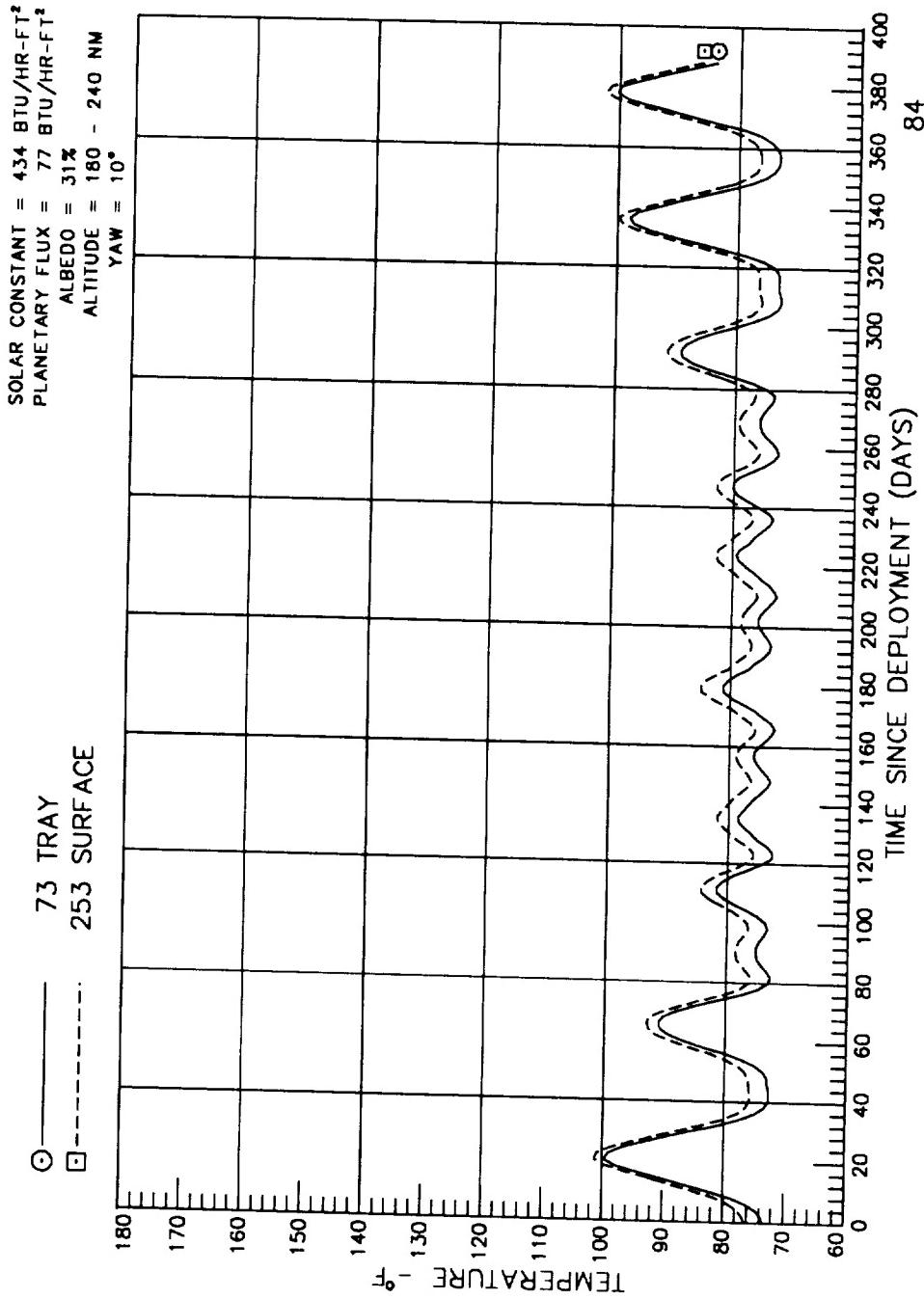
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: G4



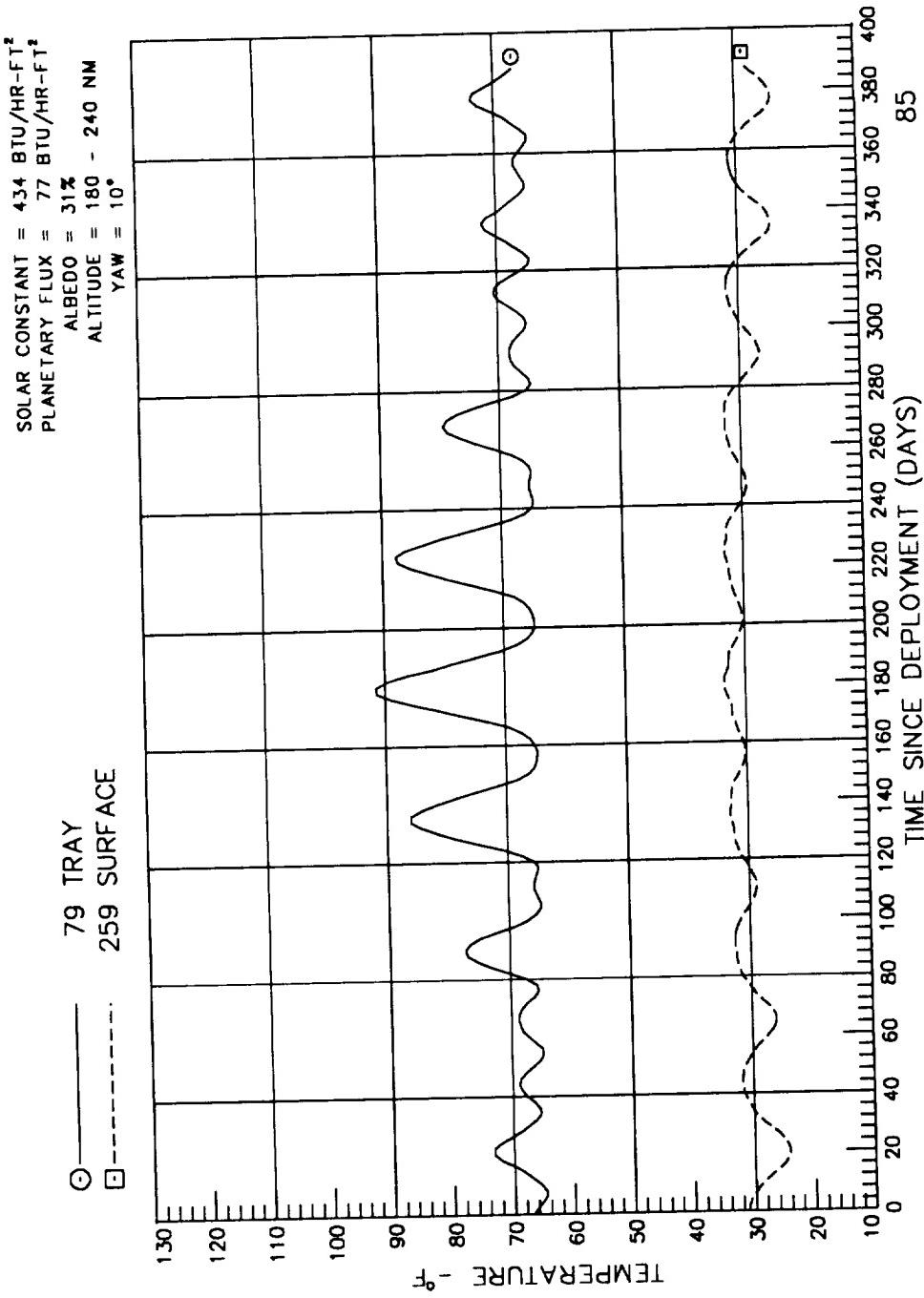
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: G6



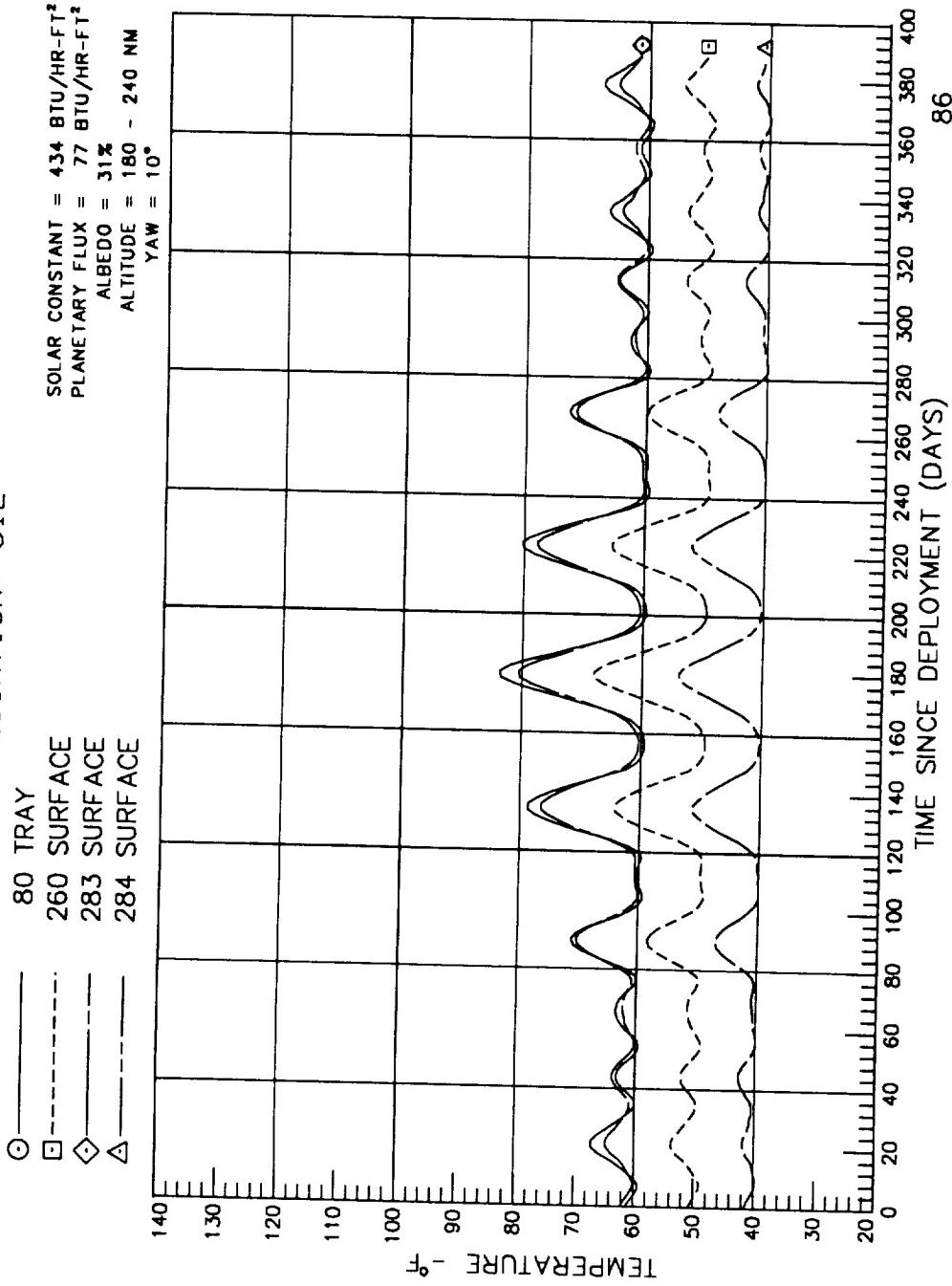
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: G8



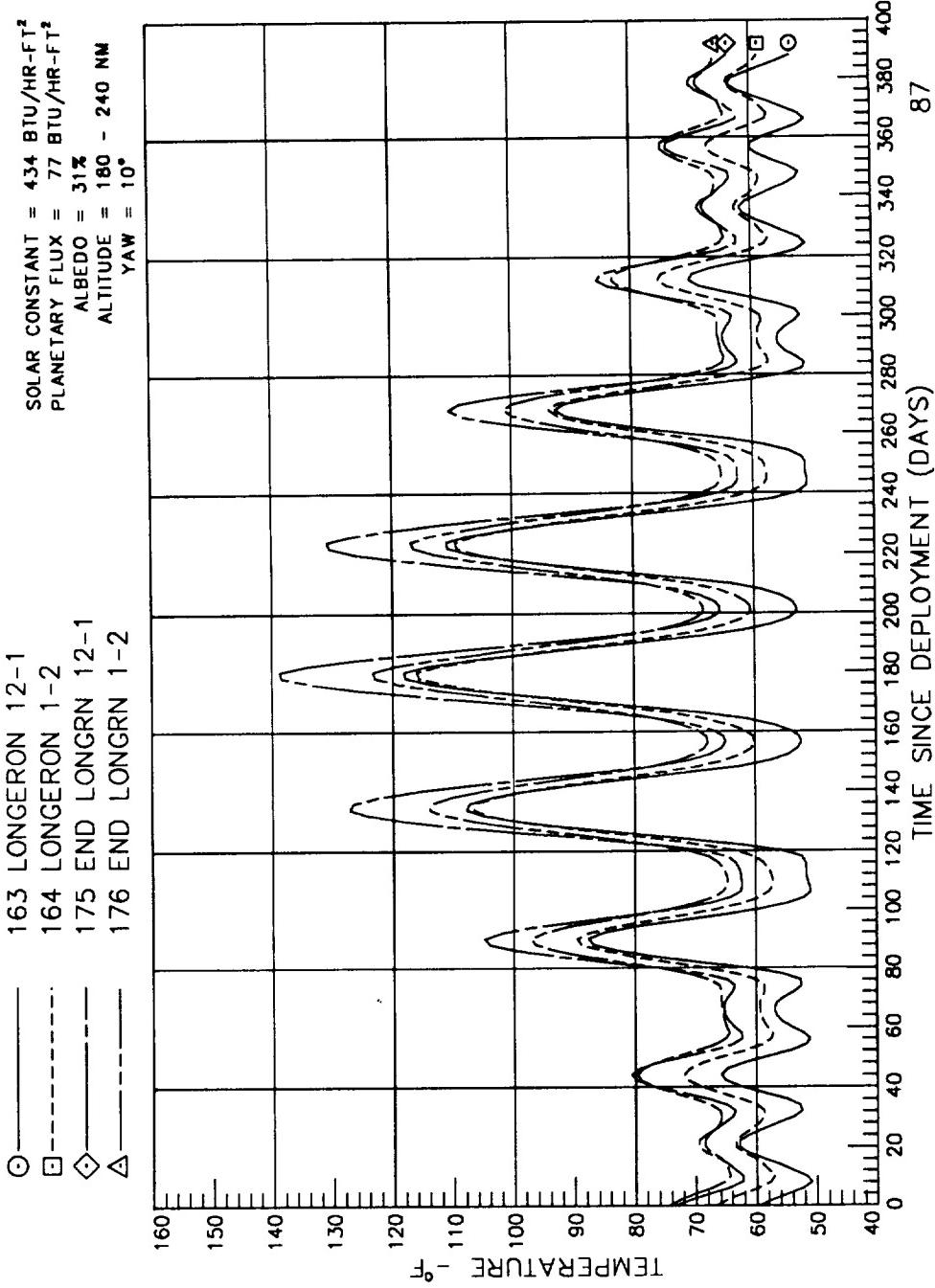
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: 610



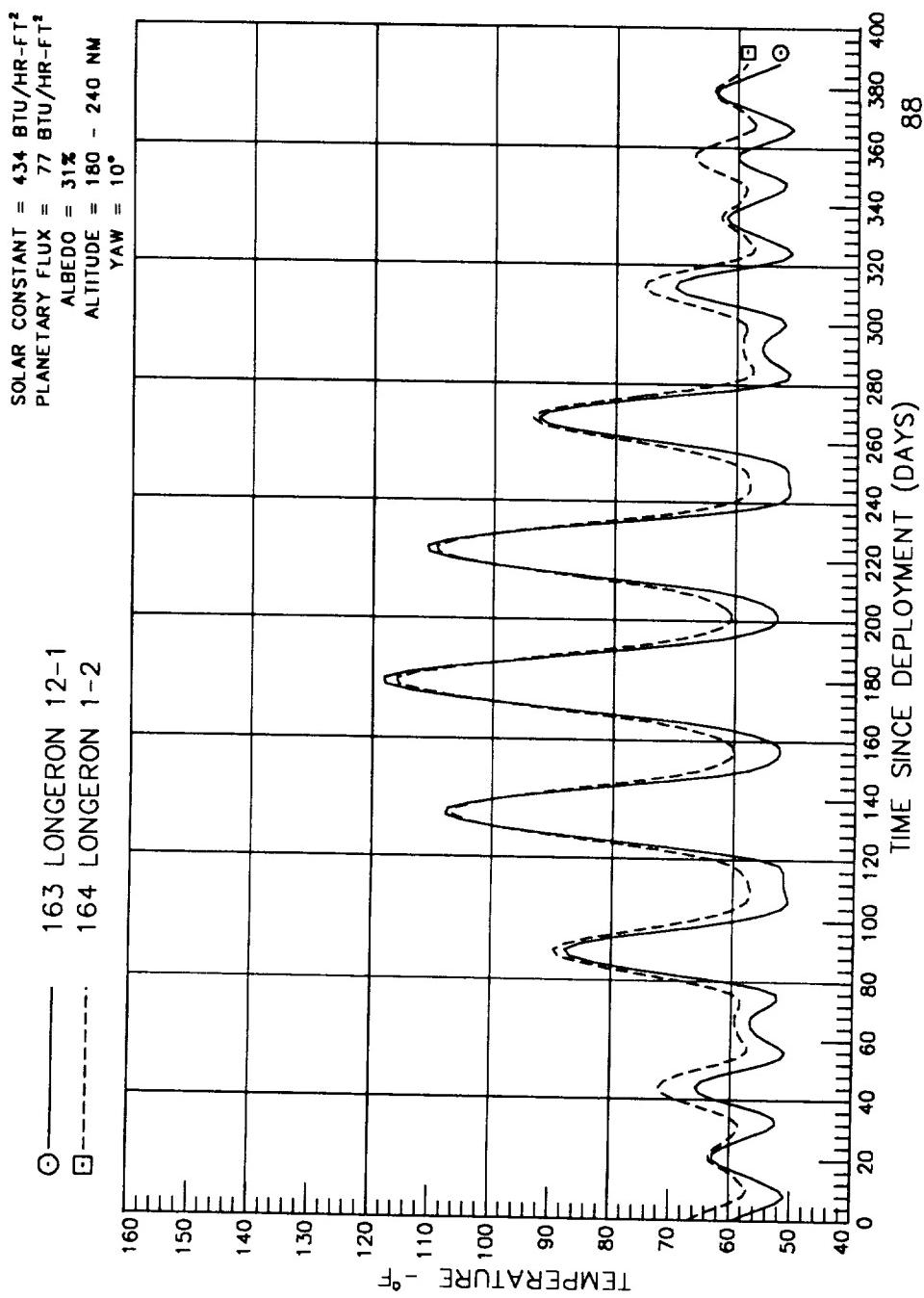
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 LOCATION: 612



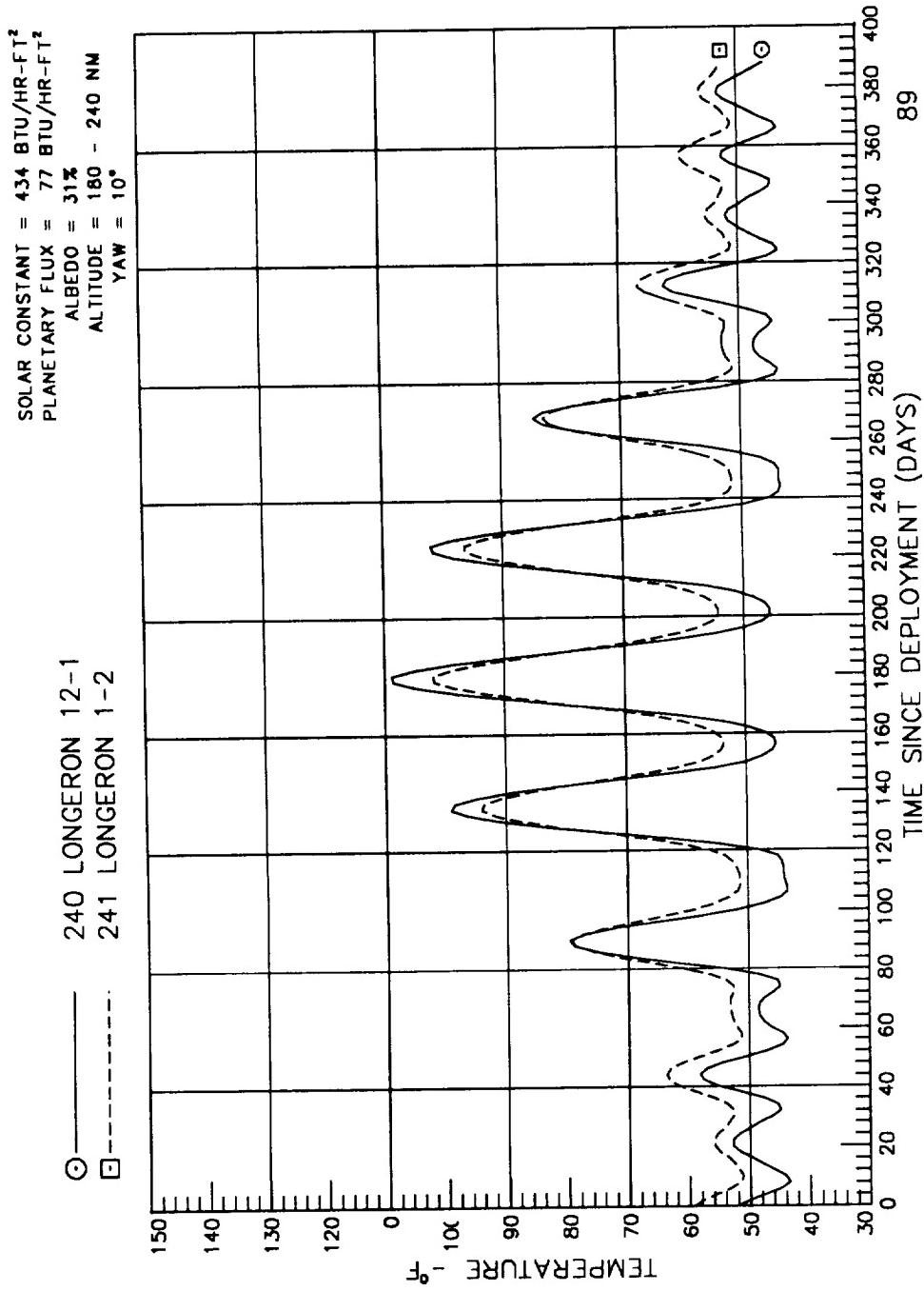
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A1



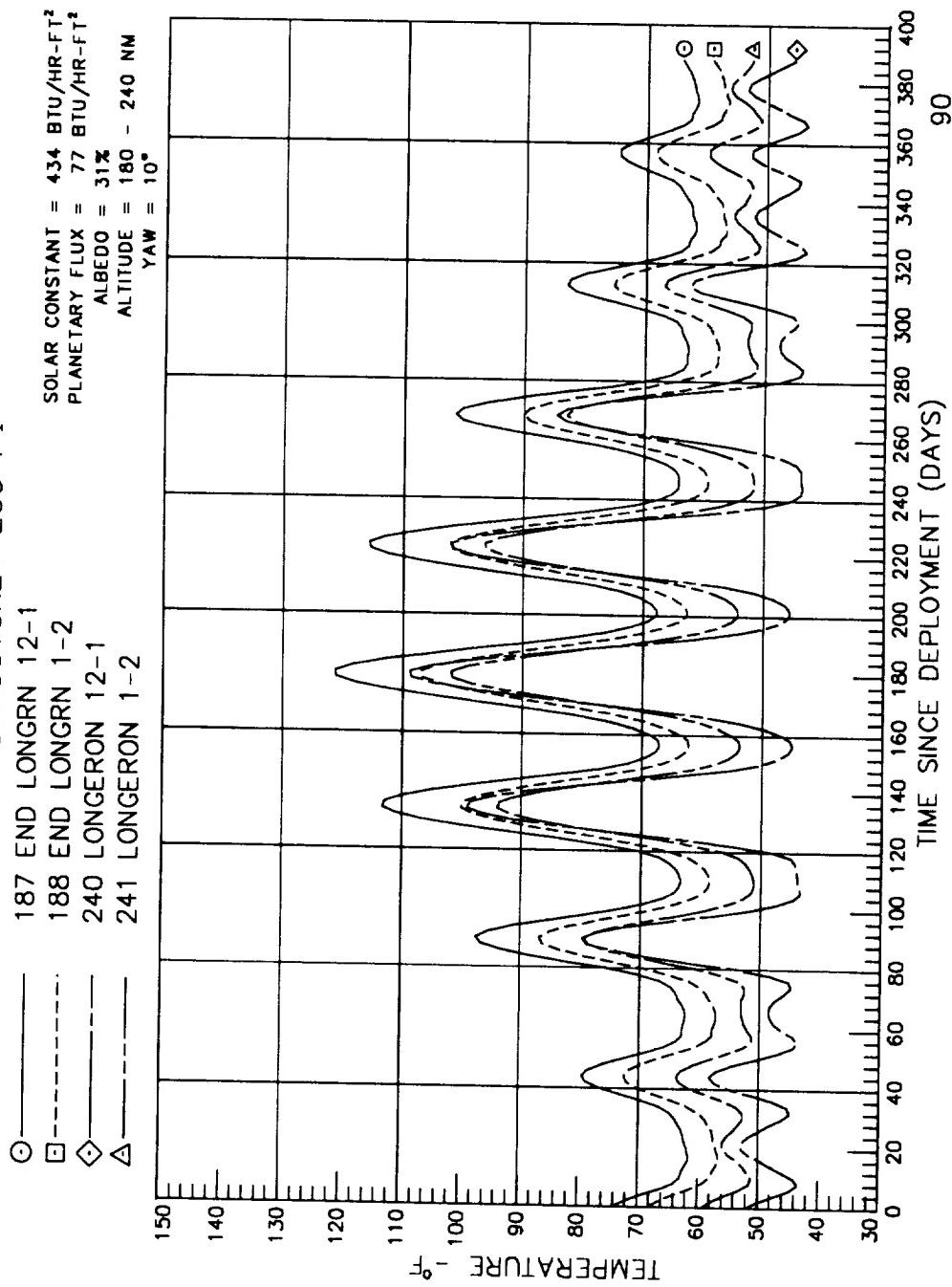
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B1 & C1



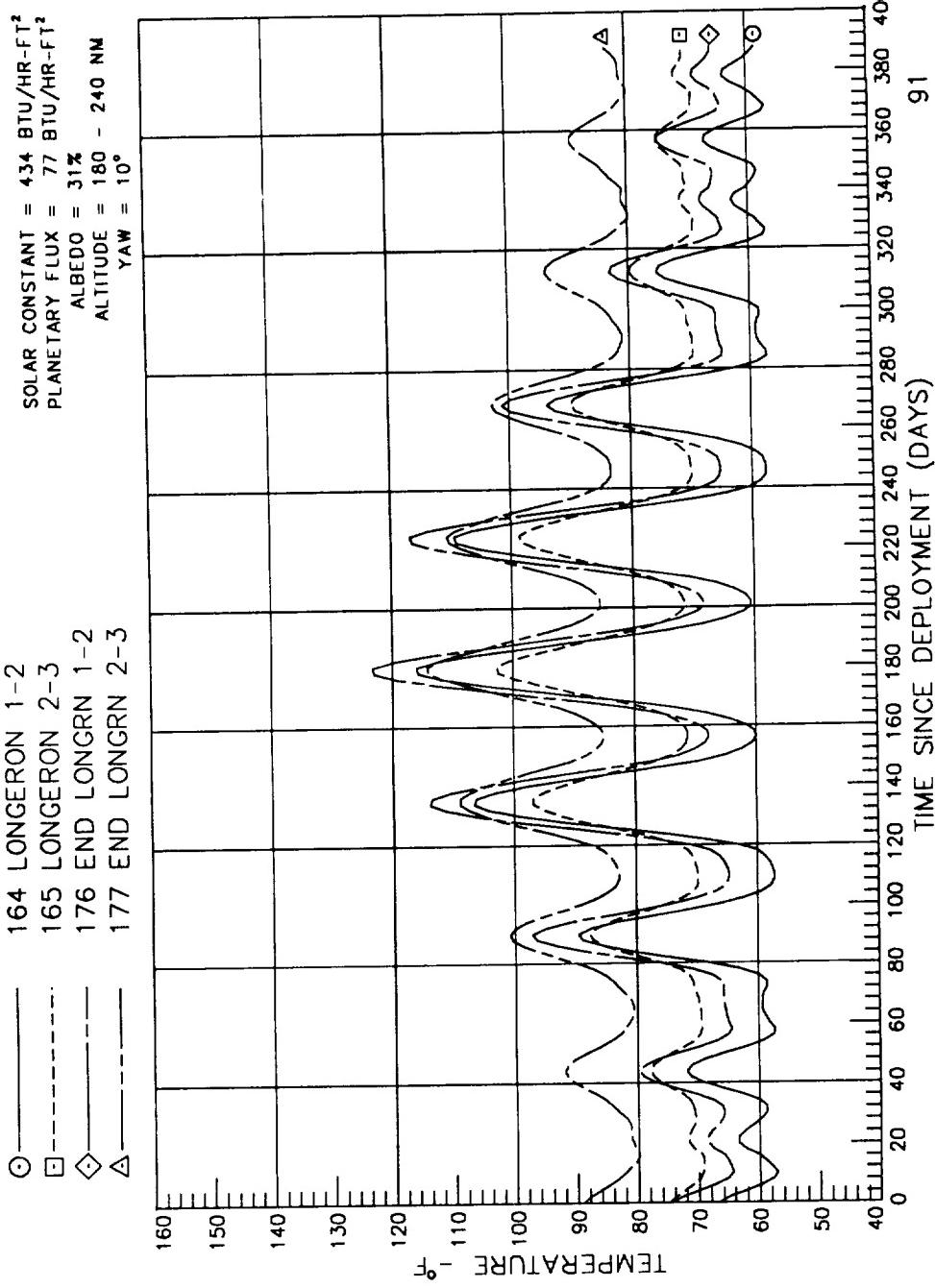
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D1 & E1



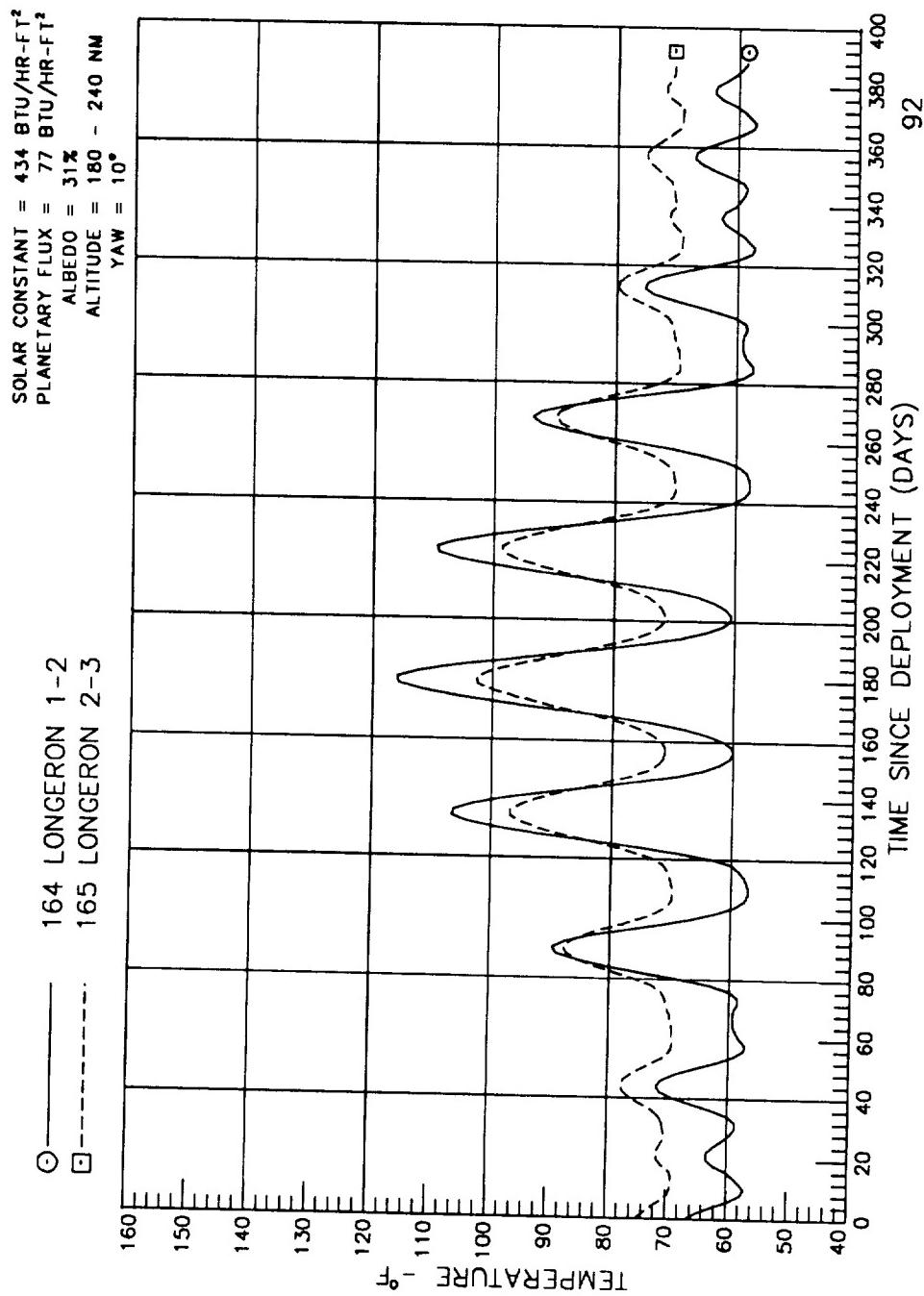
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F1



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
STRUCTURE: LOC A2

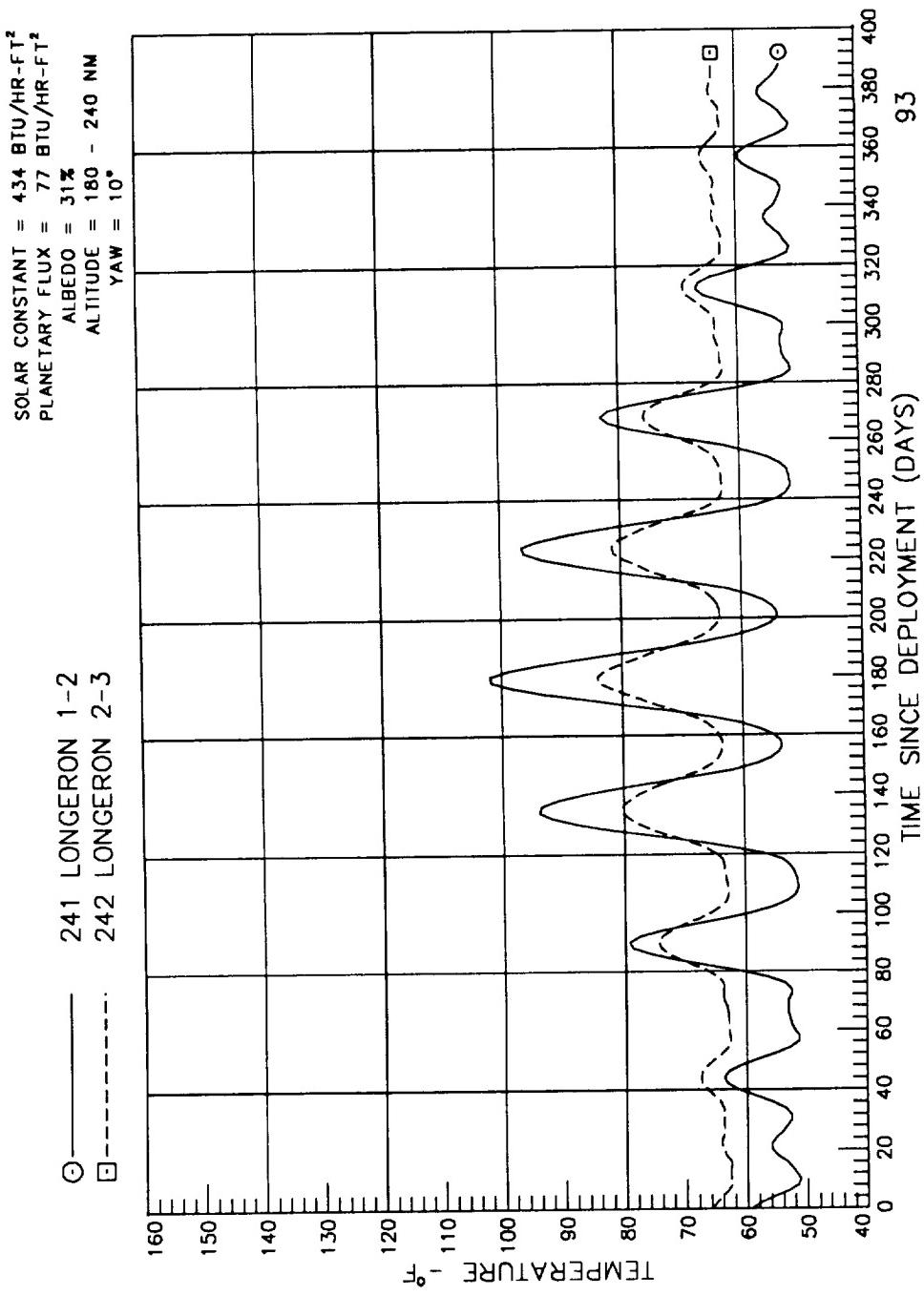


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B2 & C2

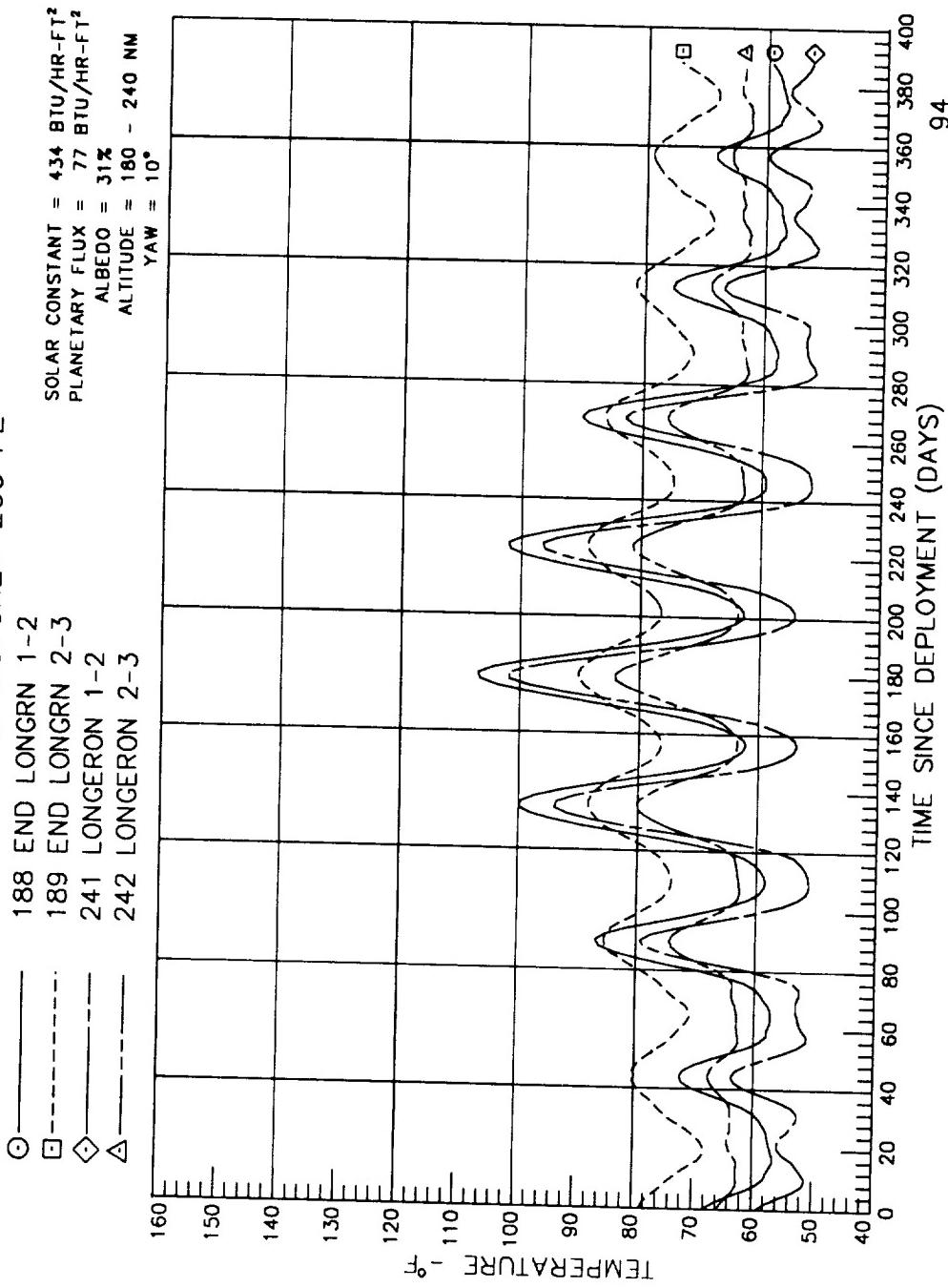


92

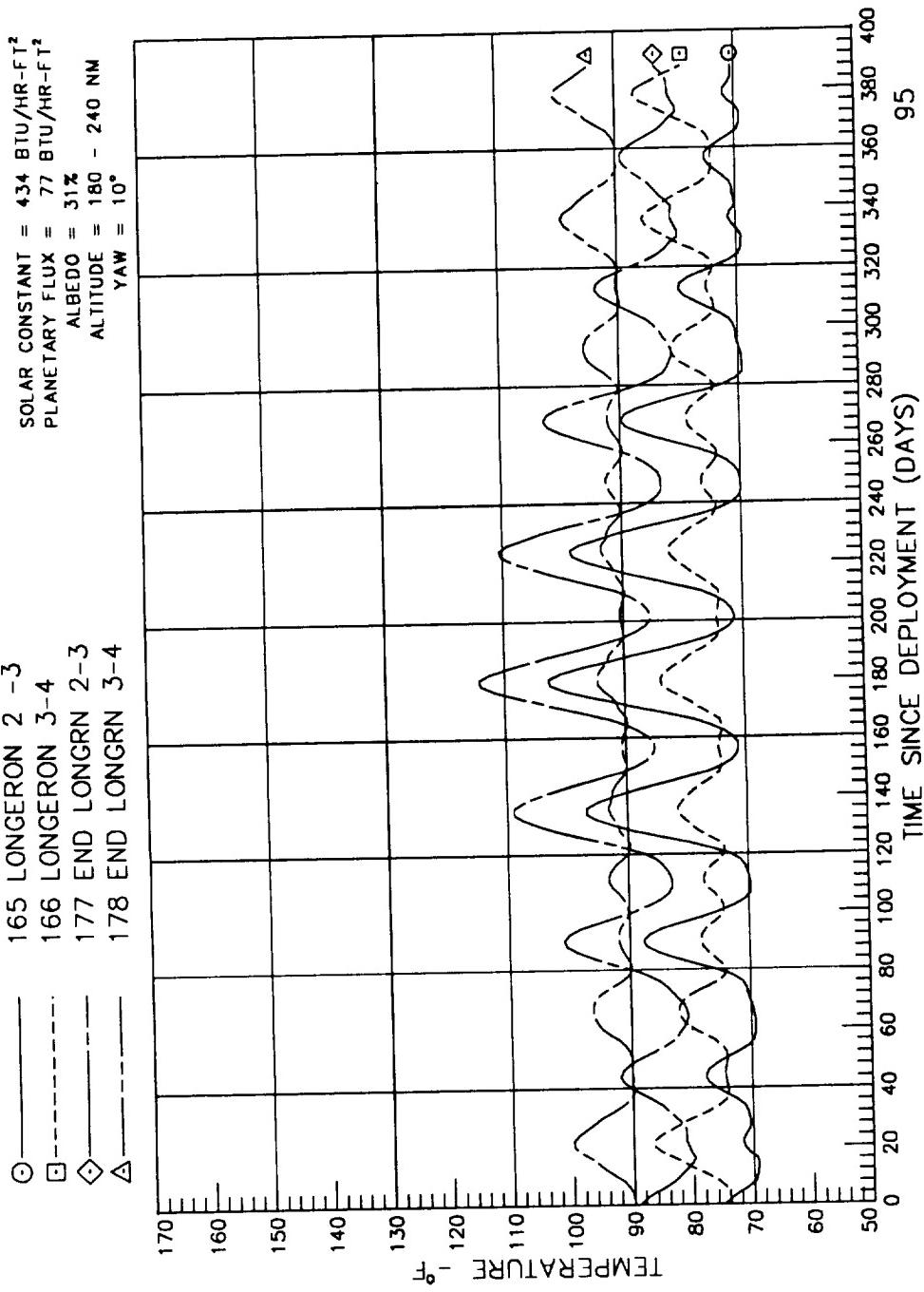
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D2 & E2



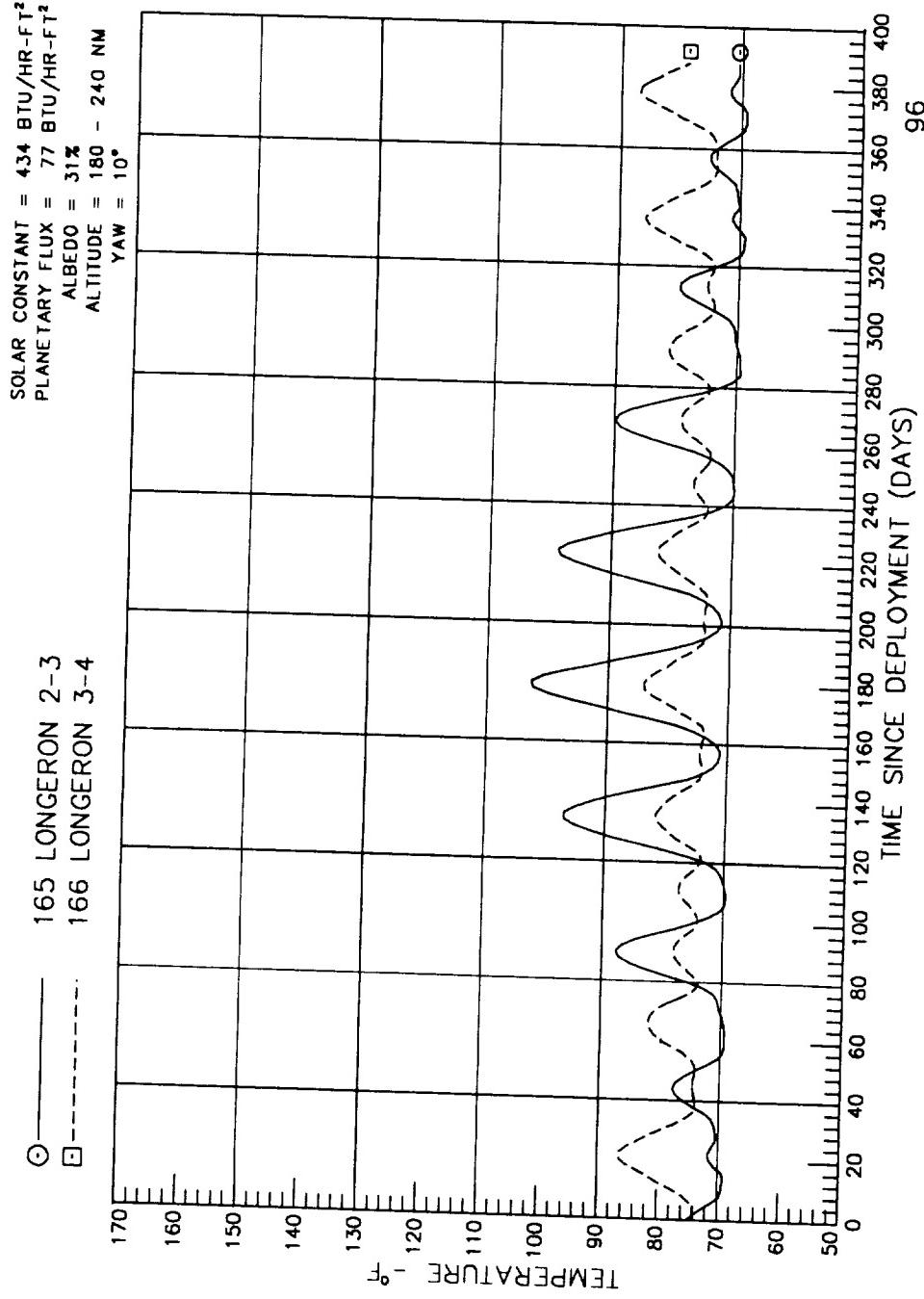
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F2



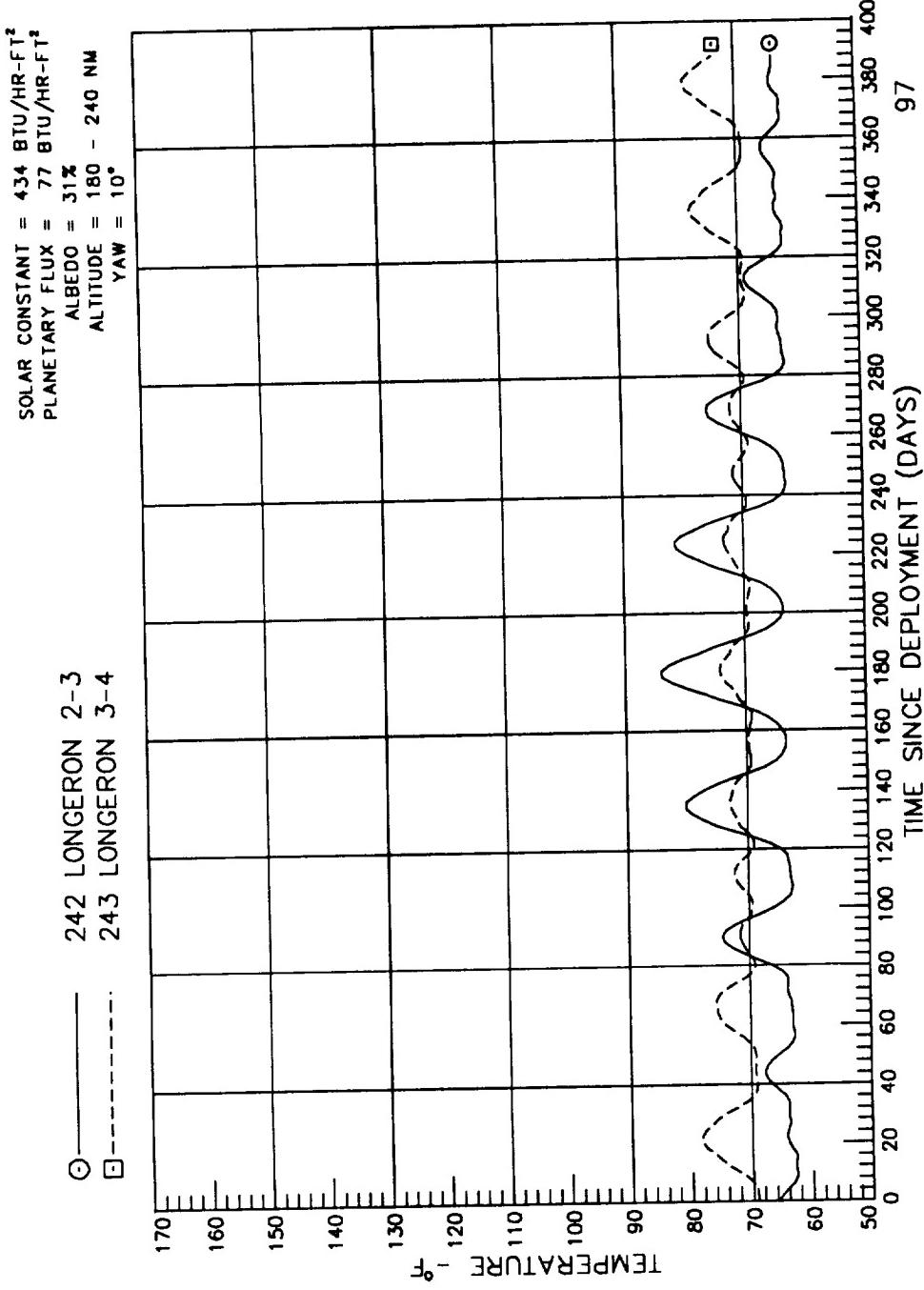
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B3 & C3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D3 & E3



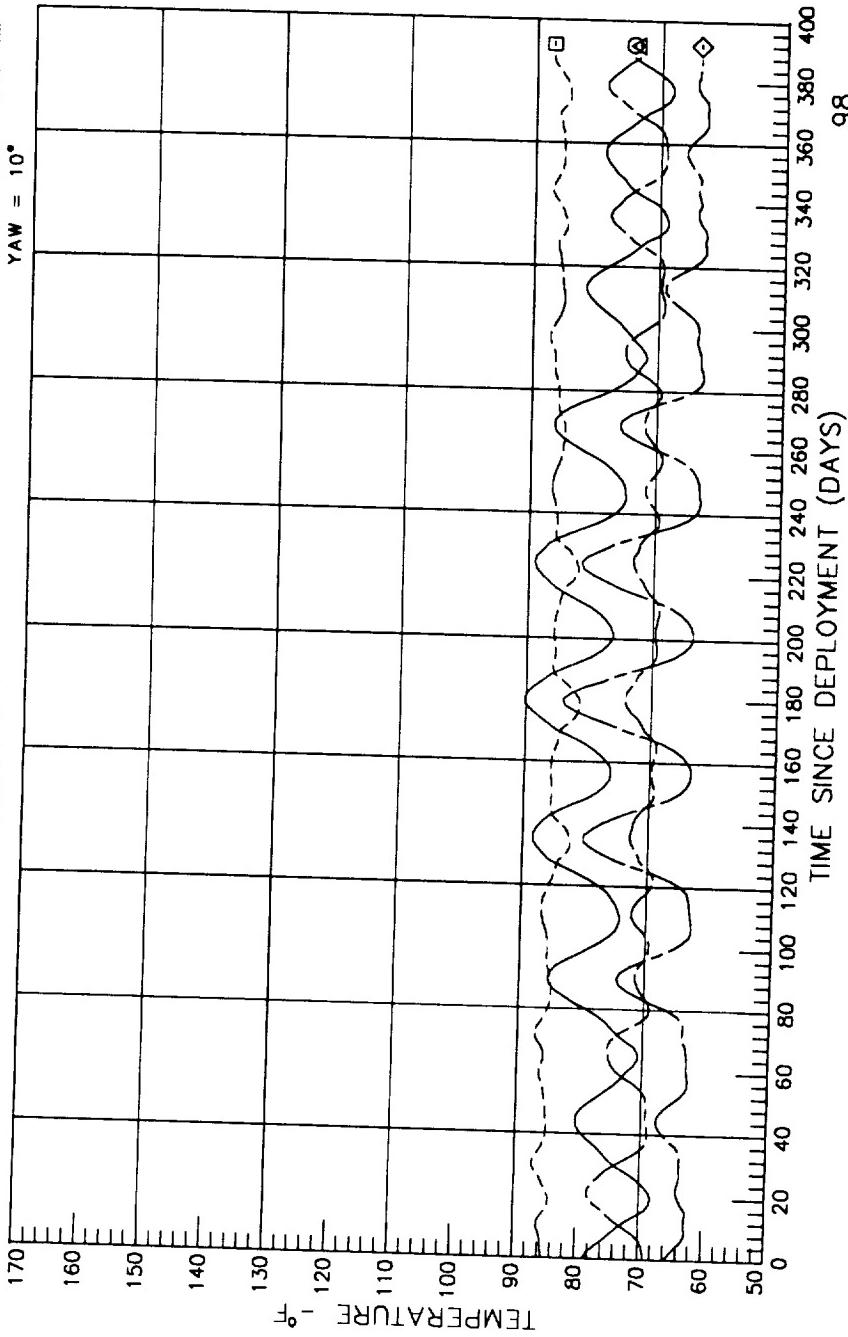
TIME SINCE DEPLOYMENT (DAYS)

97

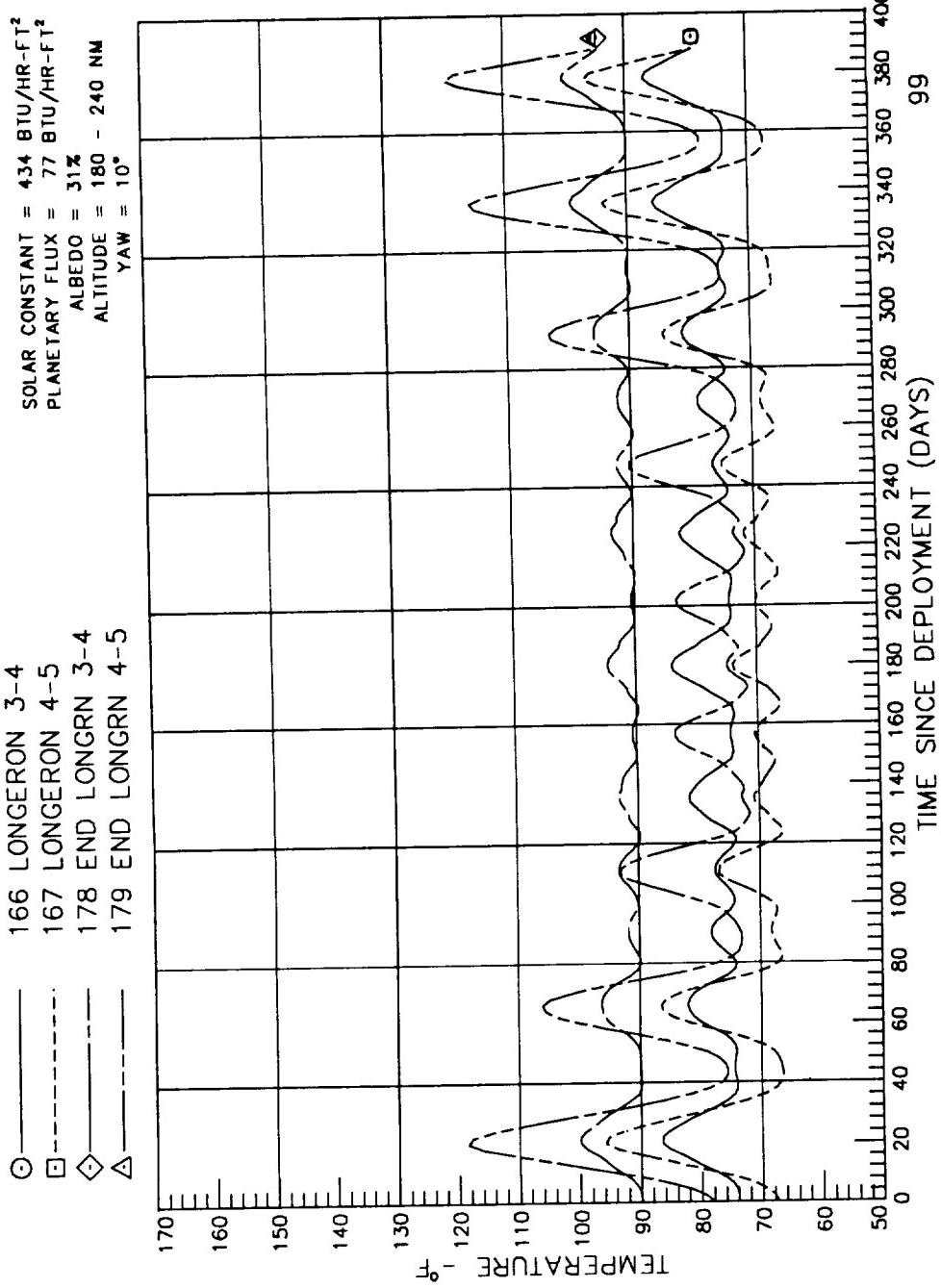
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F3

○	189 END LONGRN 2-3
□	190 END LONGRN 3-4
◇	242 LONGERON 2-3
△	243 LONGERON 3-4

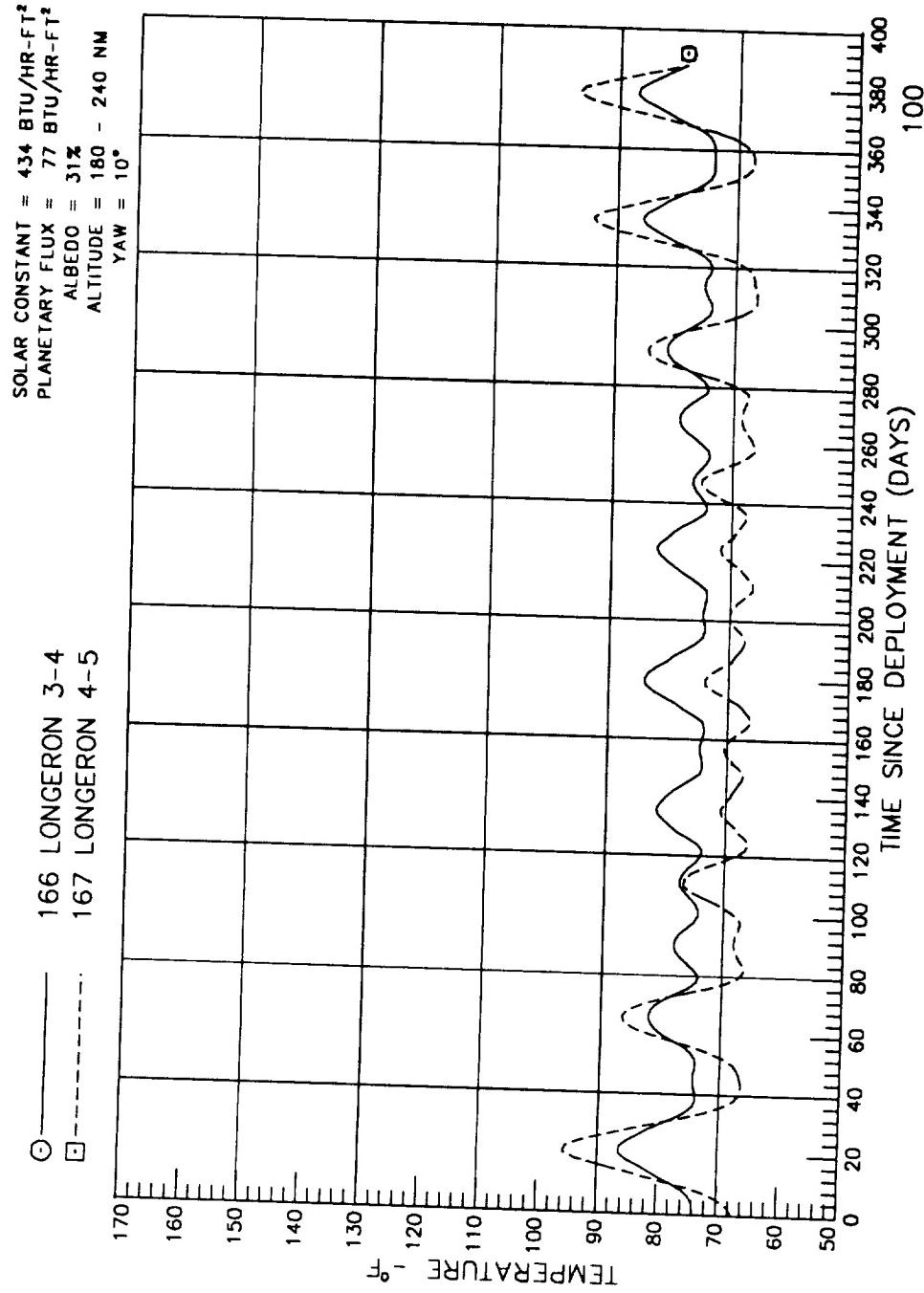
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²
 ALBEDO = 31%
 ALTITUDE = 180° - 240 NM
 YAW = 10°



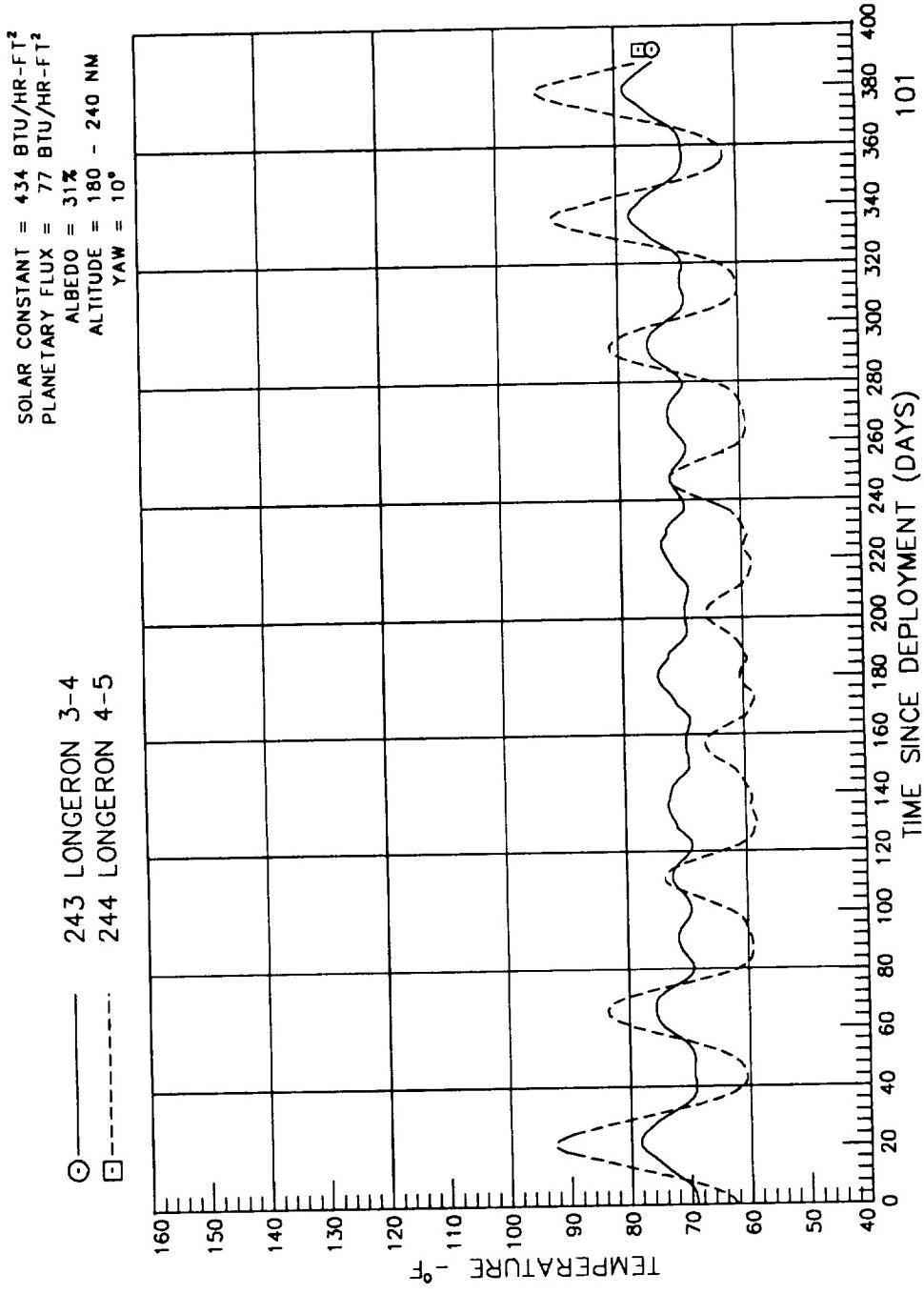
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC A4



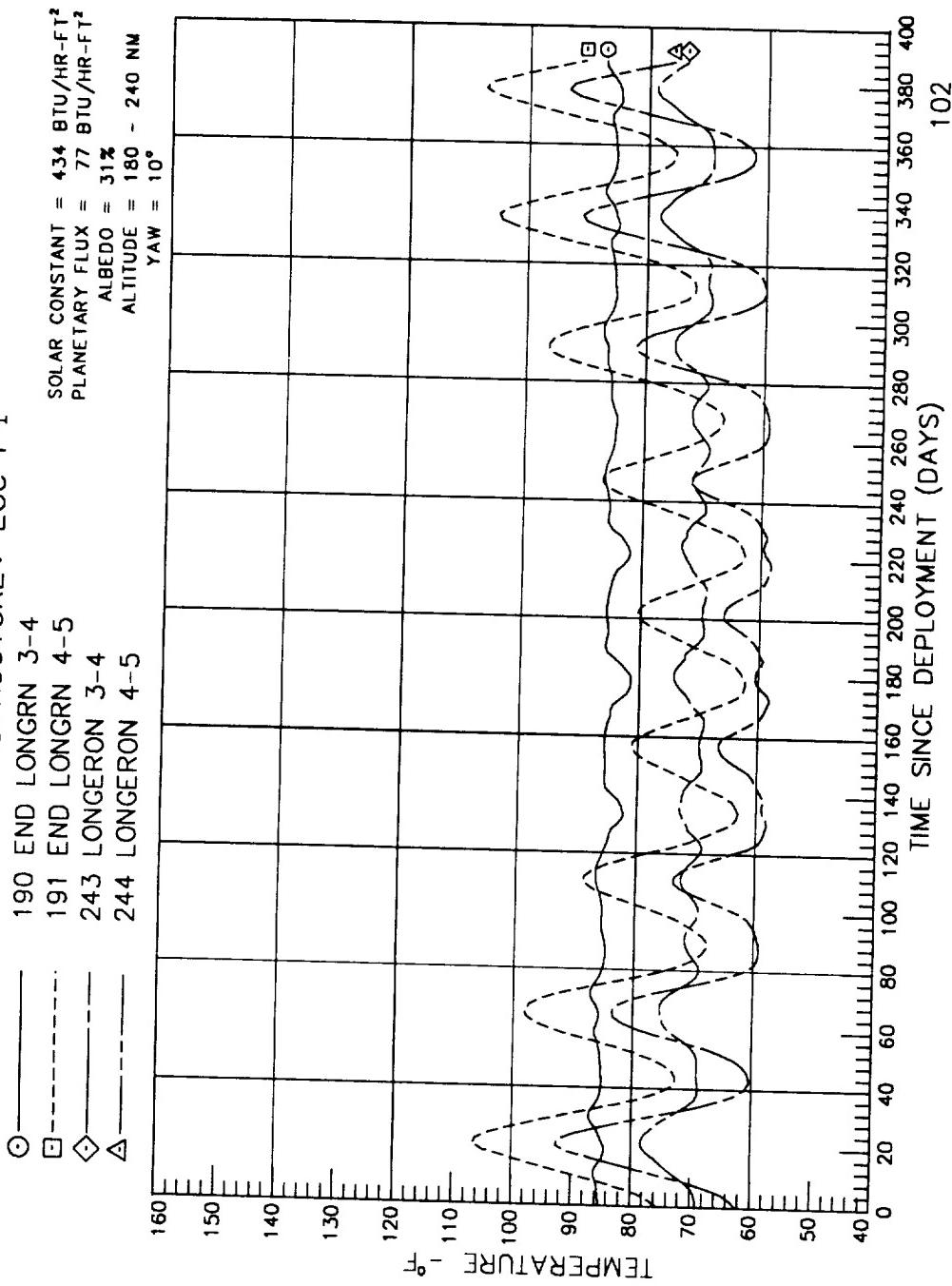
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B4 & C4



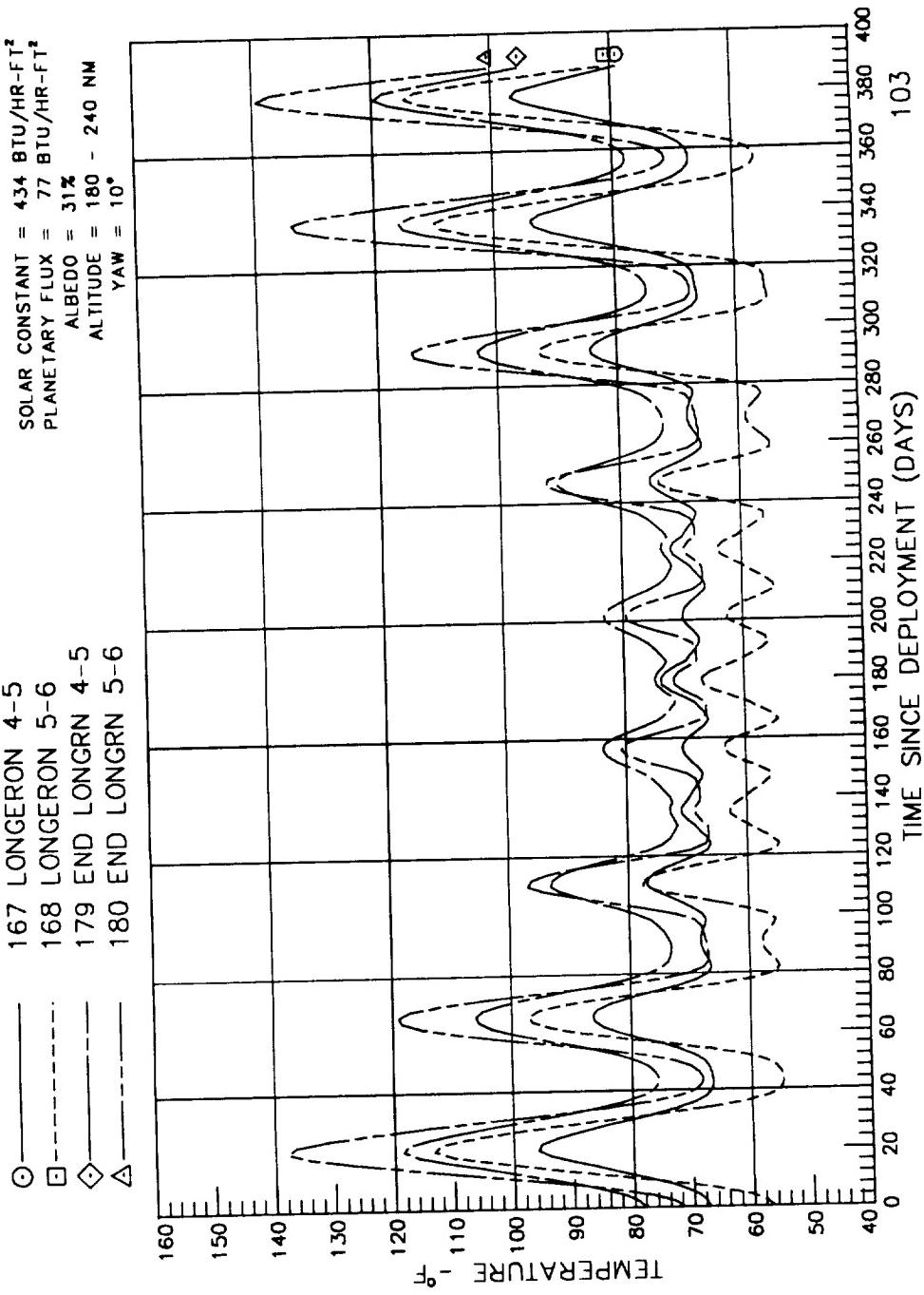
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC D4 & E4



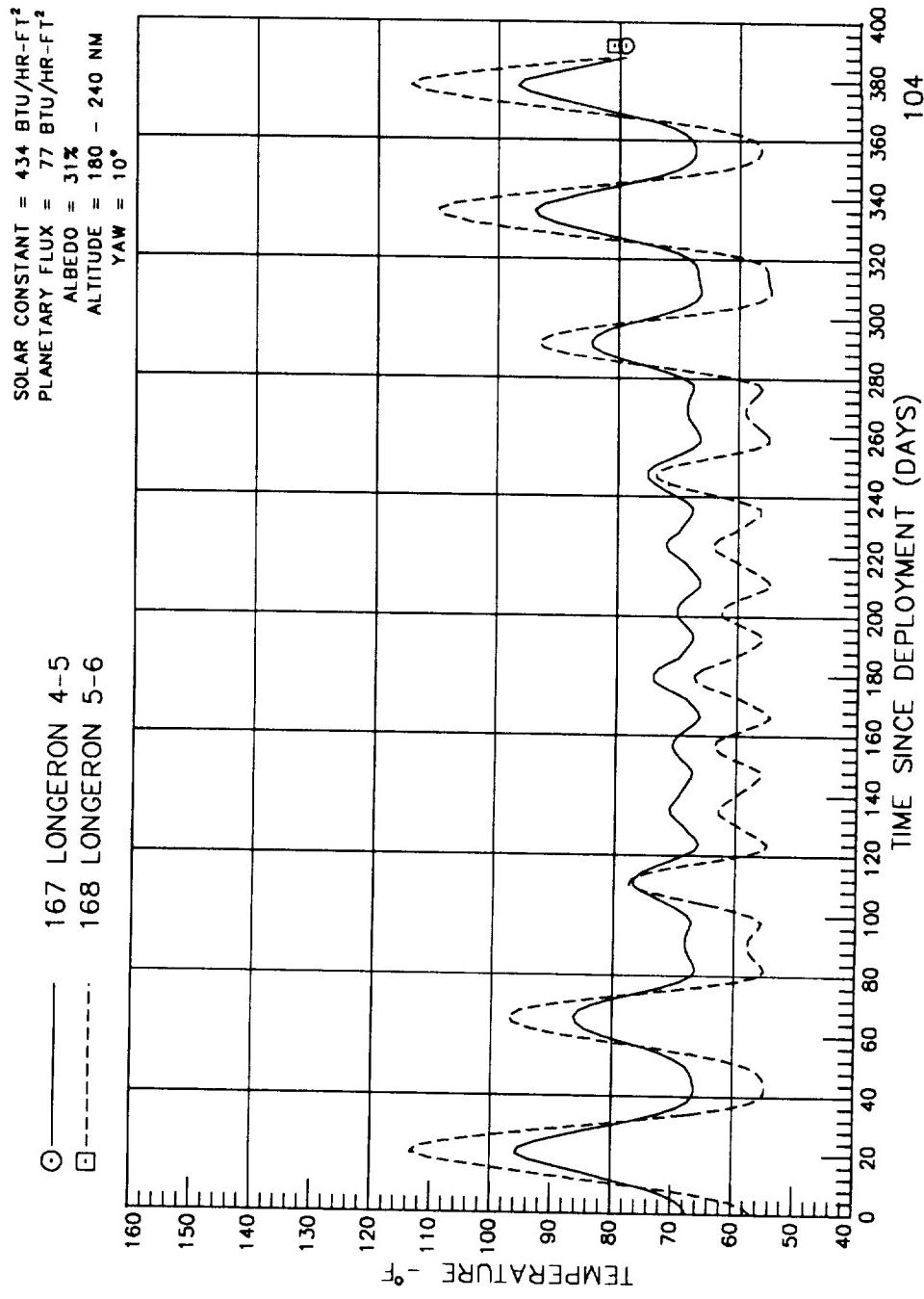
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
STRUCTURE: LOC F4



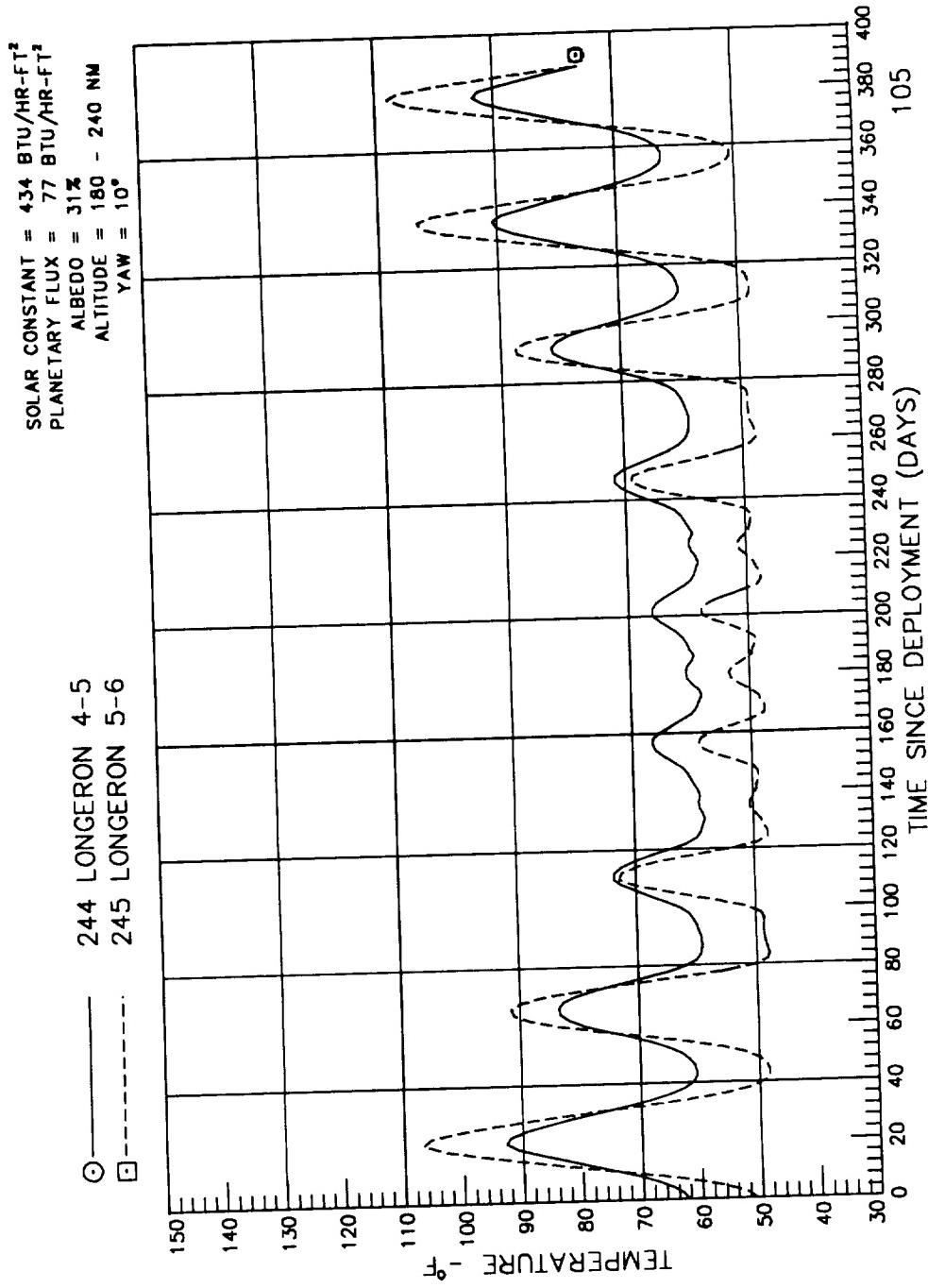
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC A5



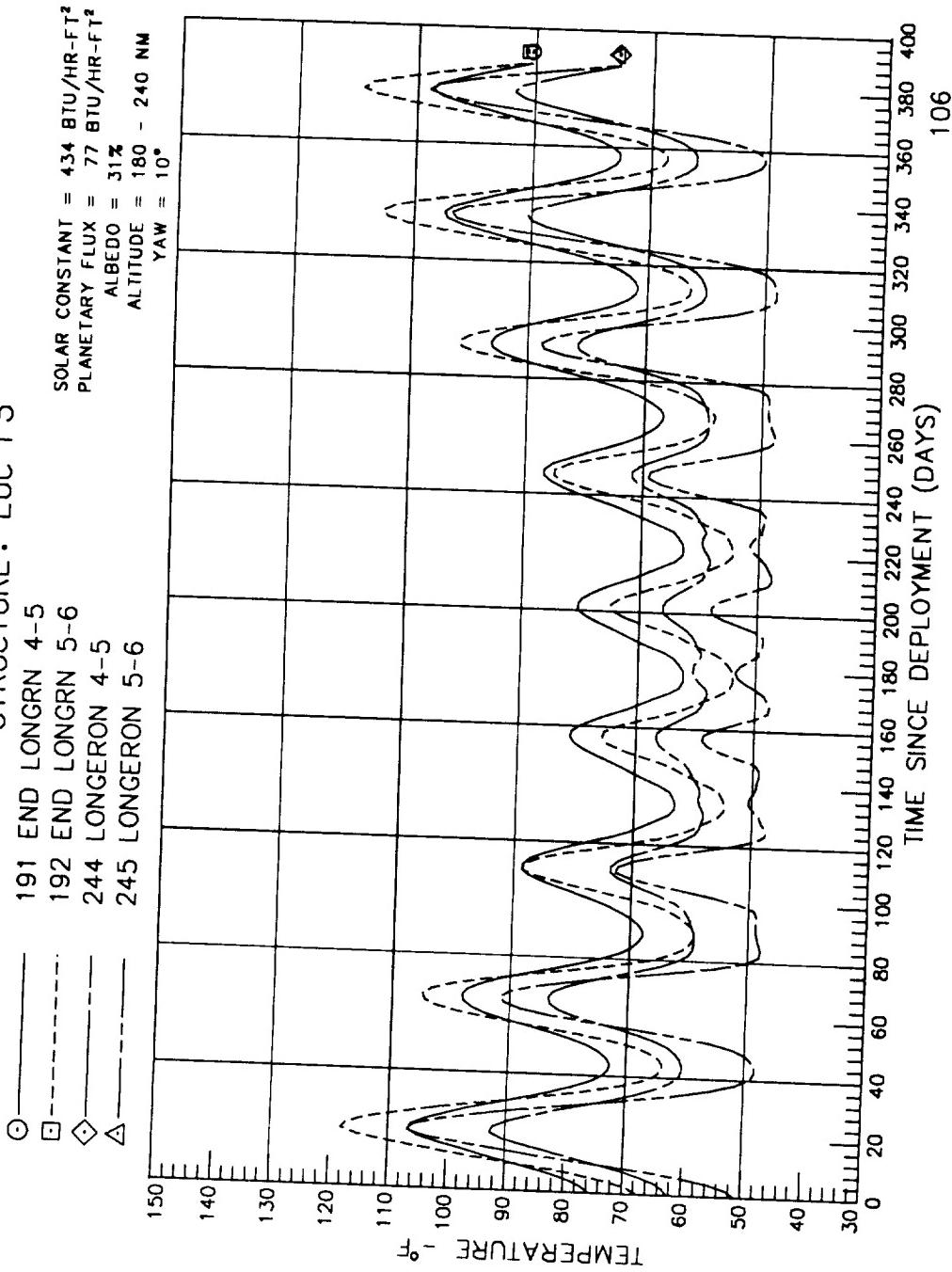
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC BS & CS



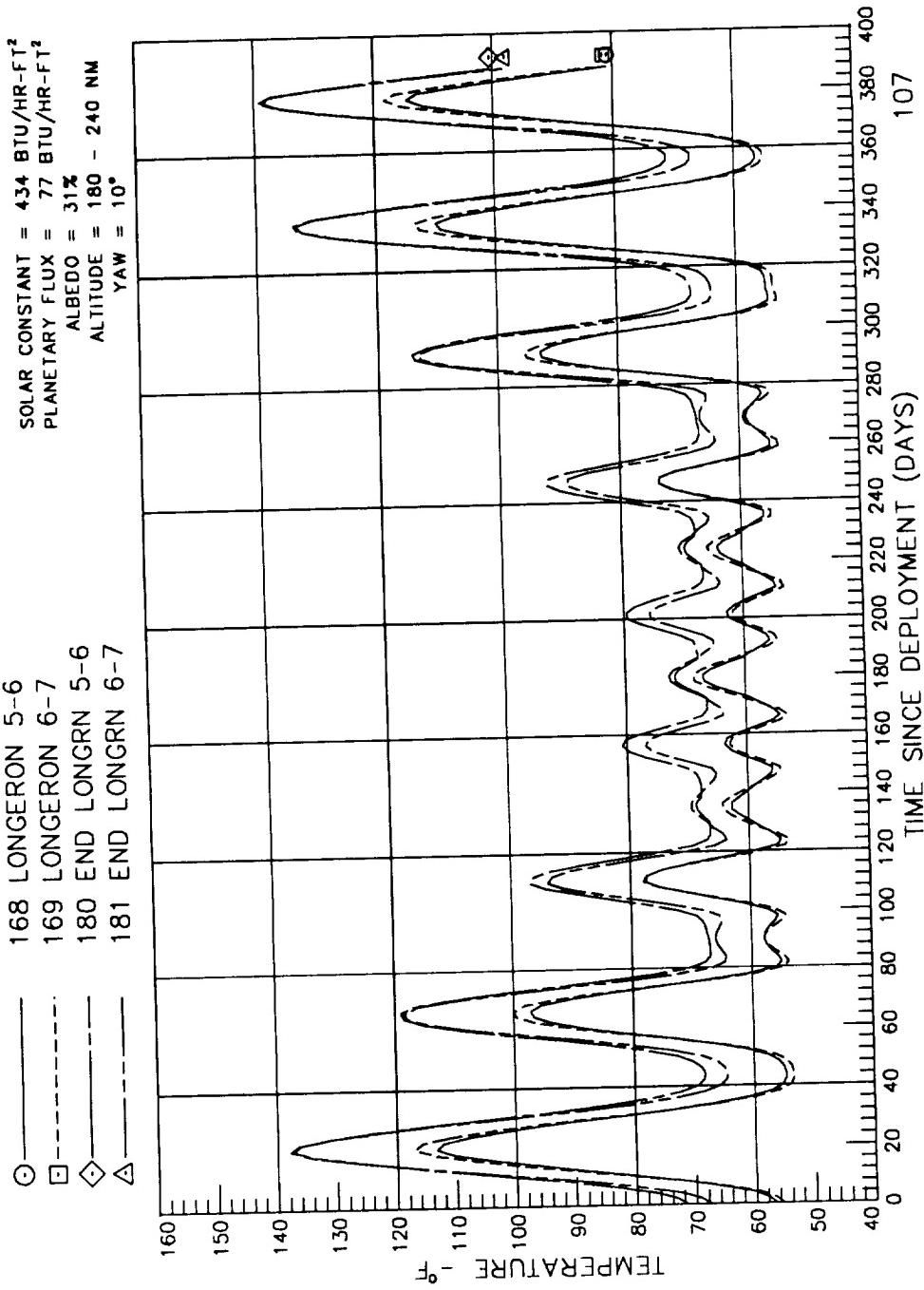
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D5 & E5



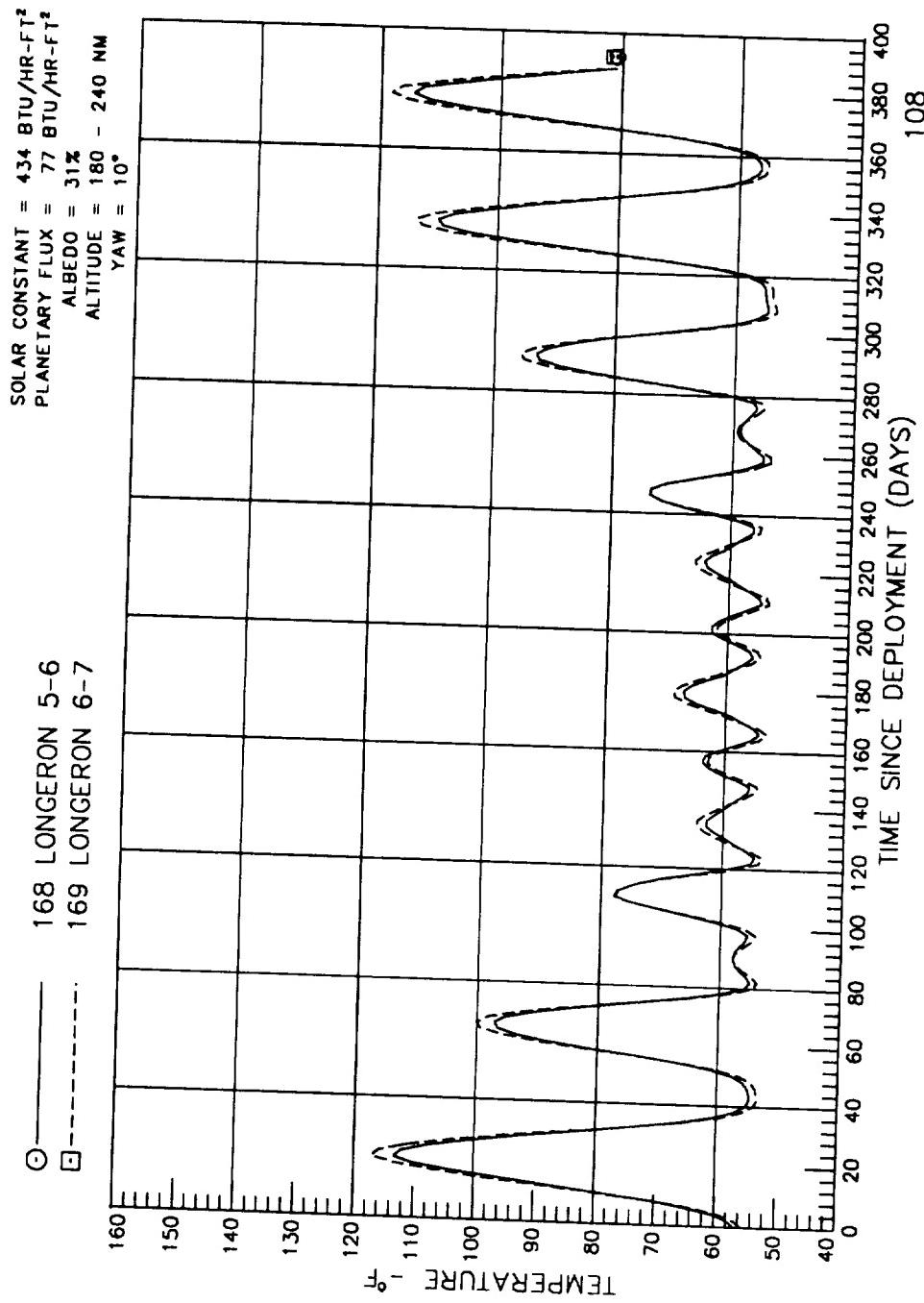
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
STRUCTURE: LOC F5



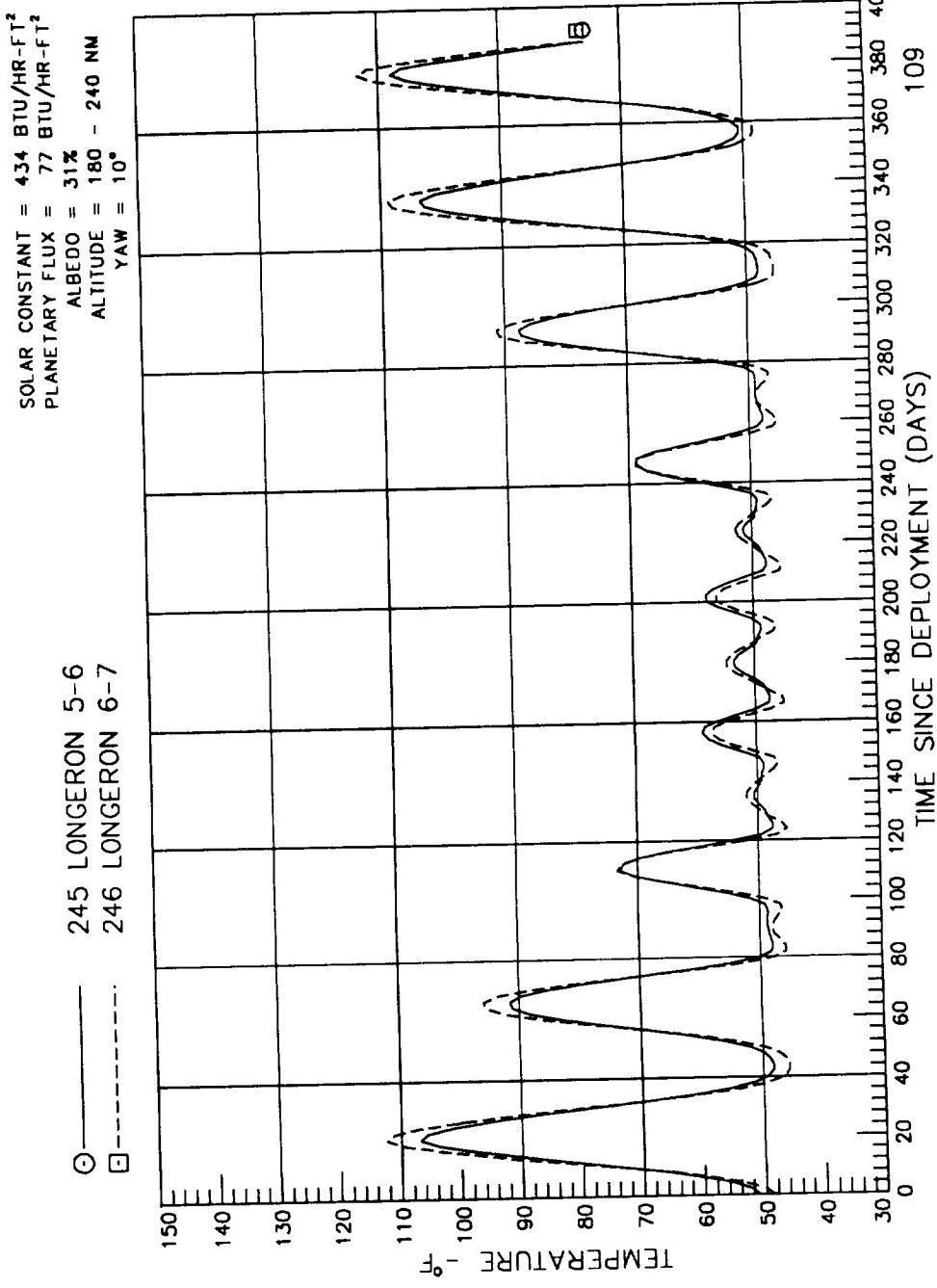
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC A6



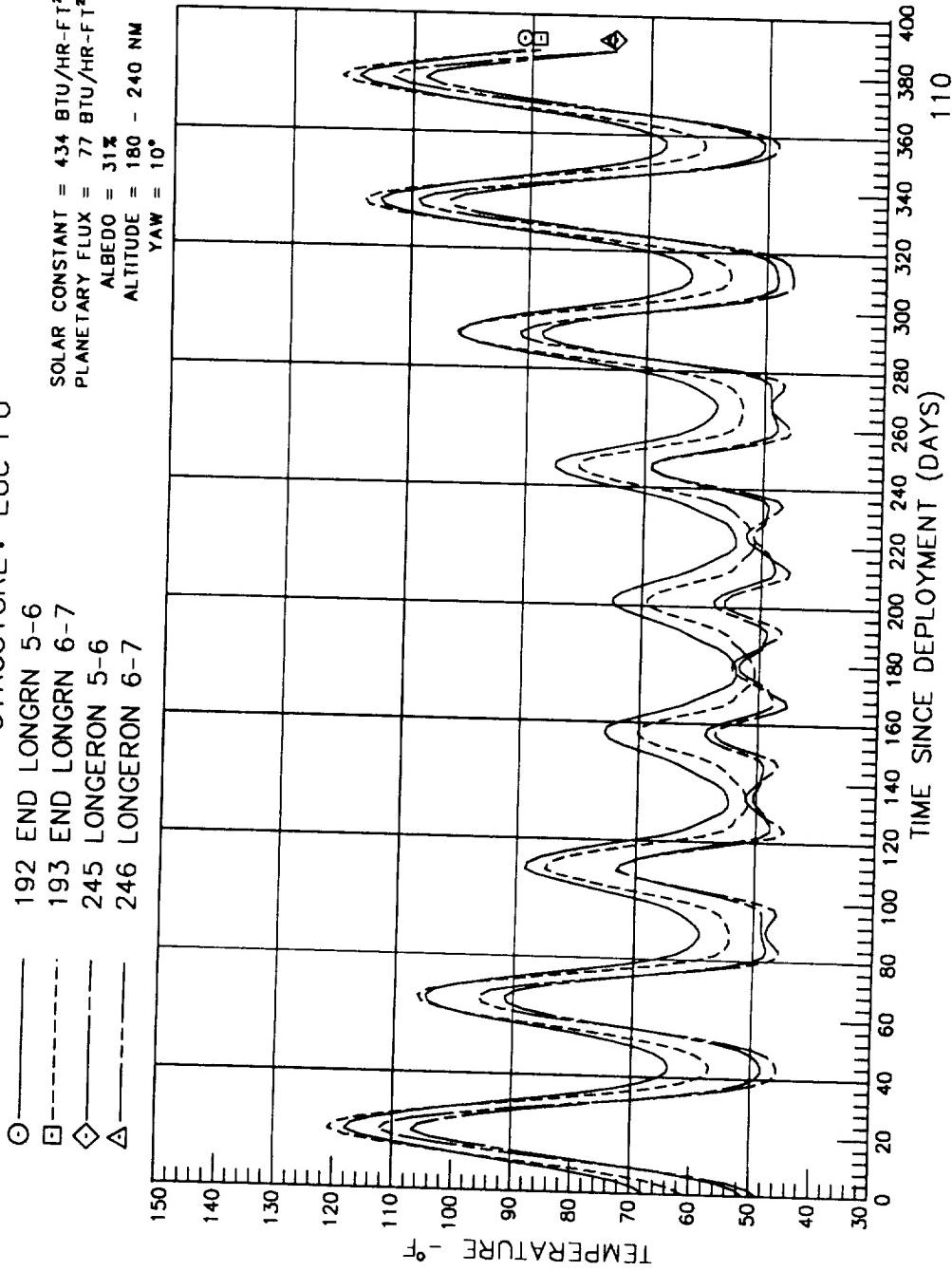
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B6 & C6



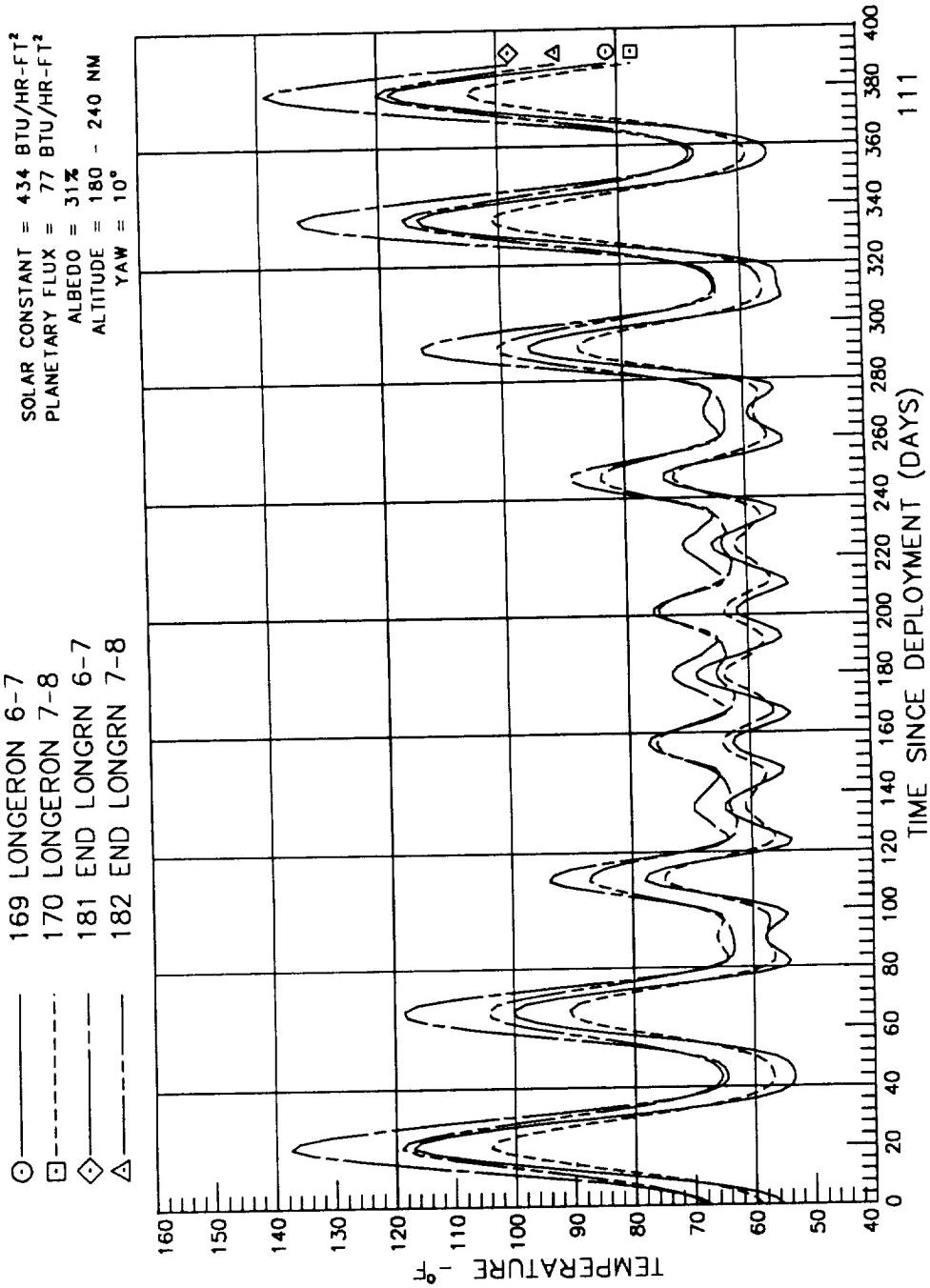
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D6 & E6



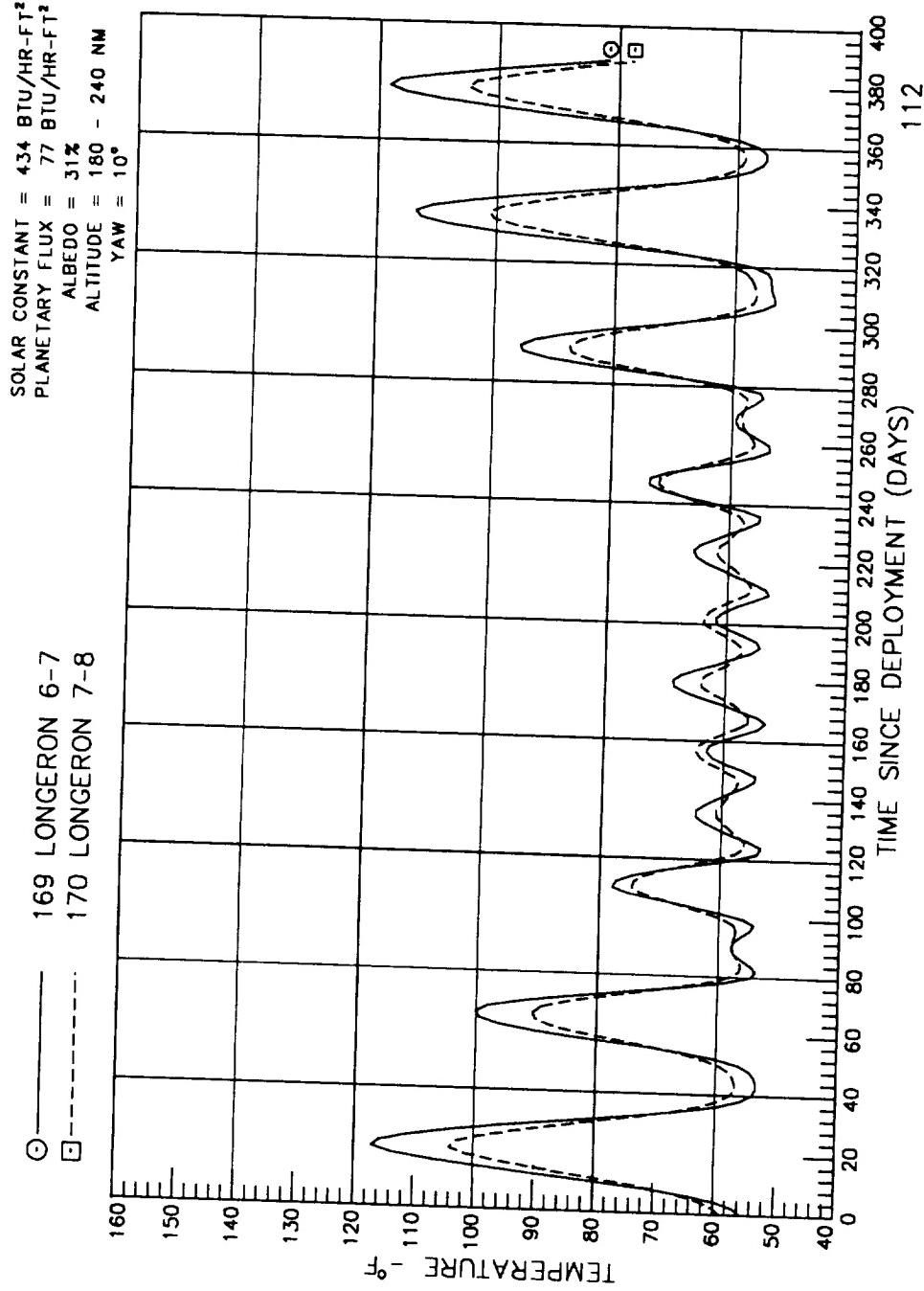
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F6



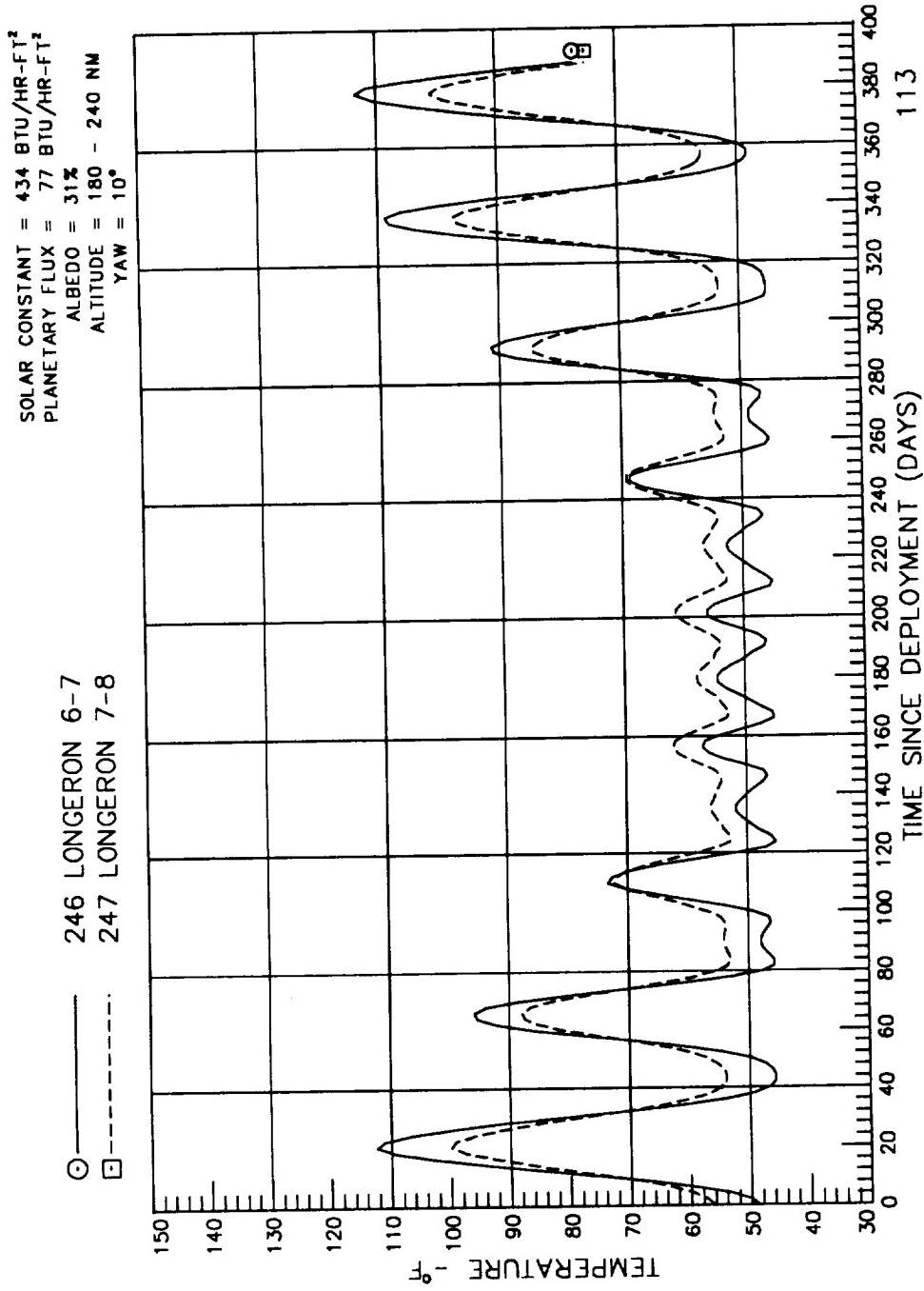
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A7



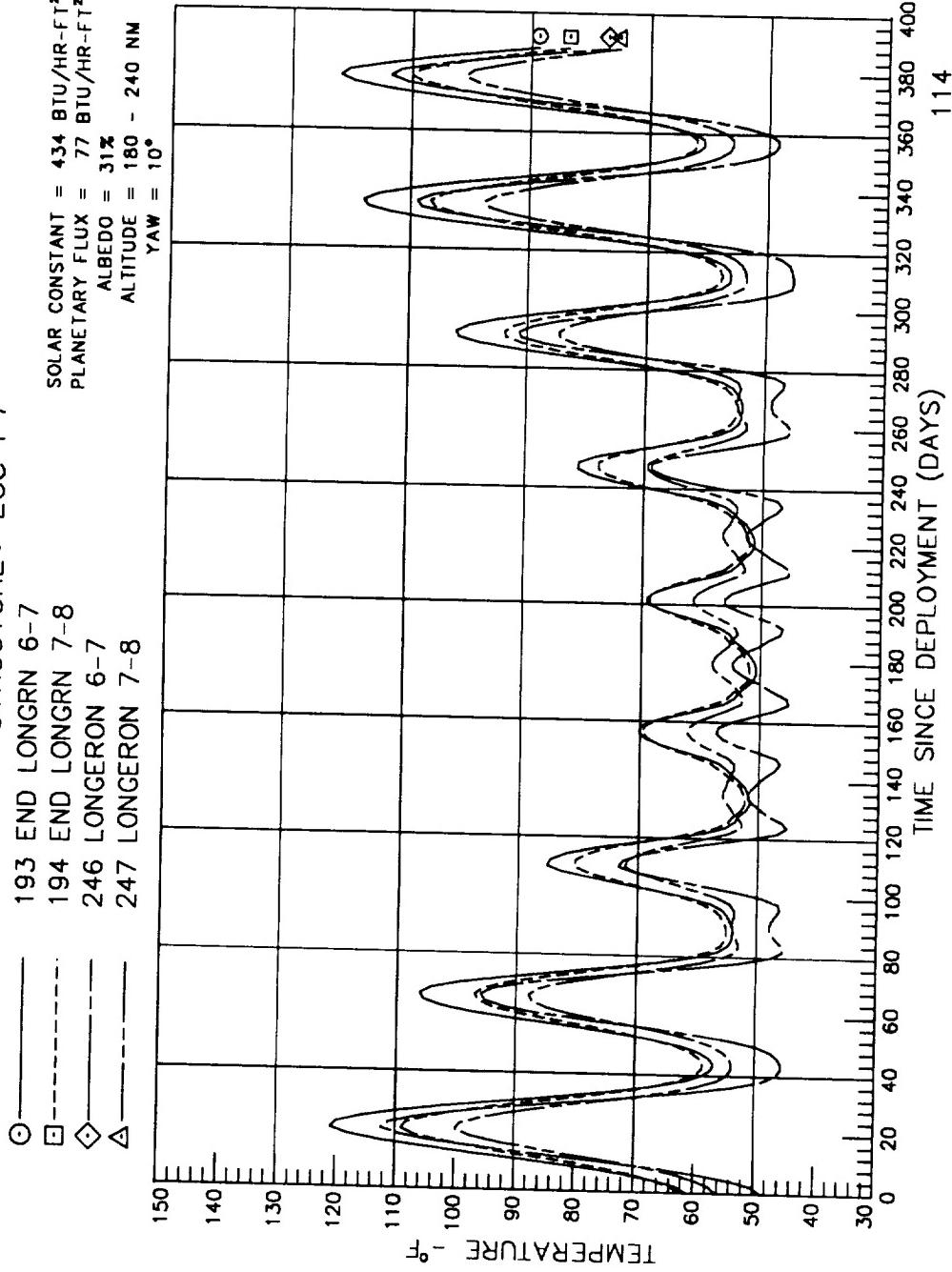
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B7 & C7



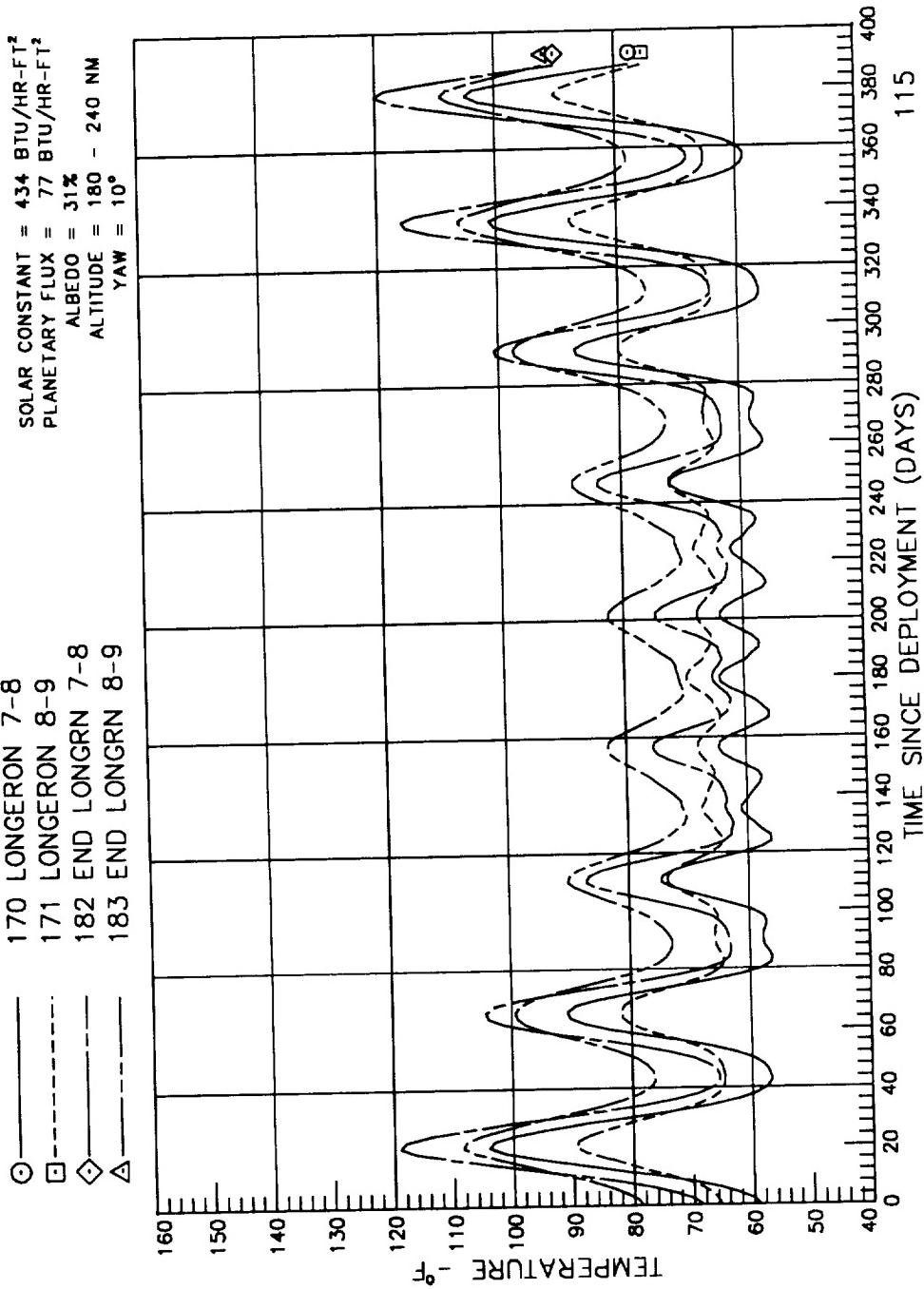
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC 07 & E7



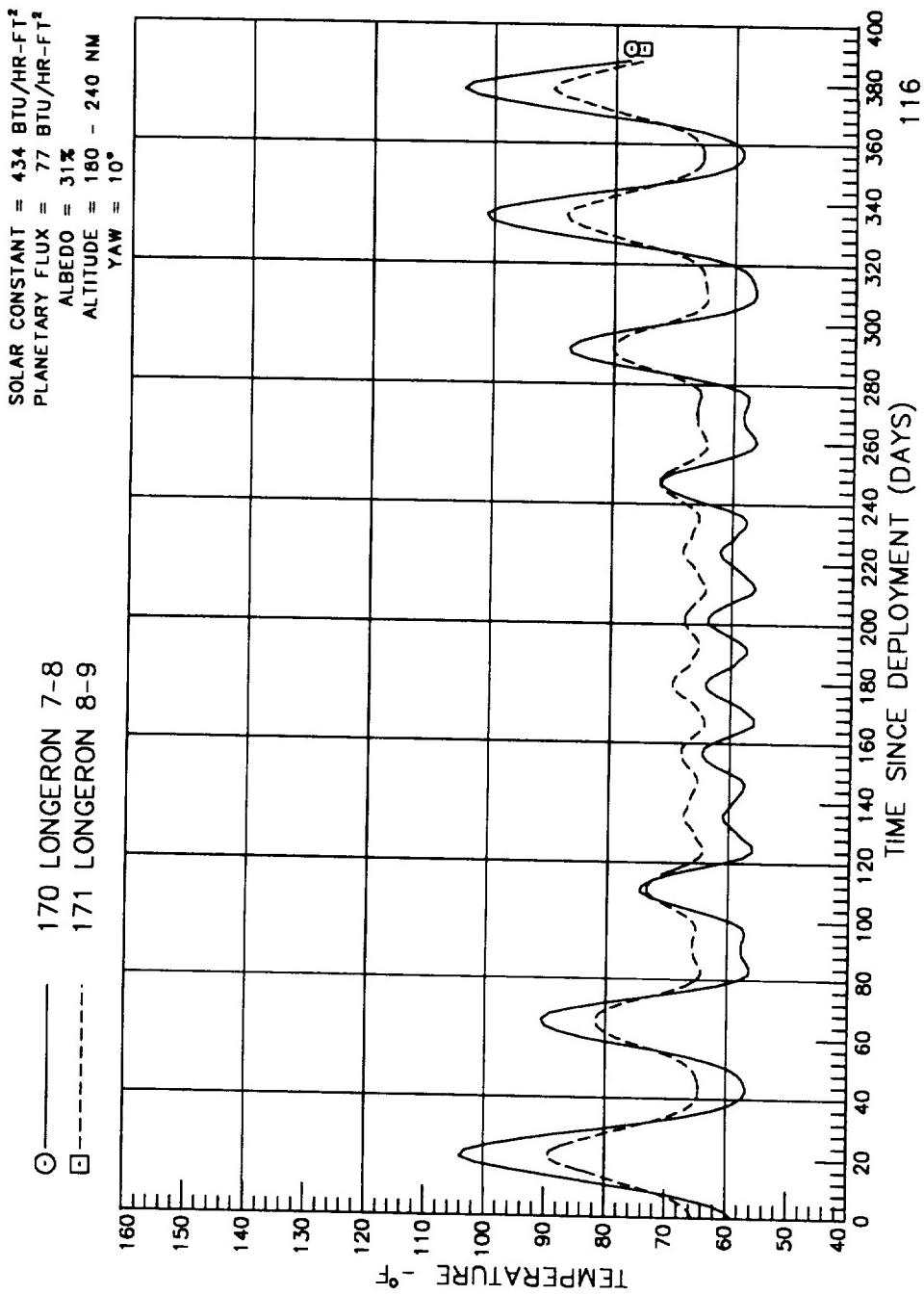
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F7



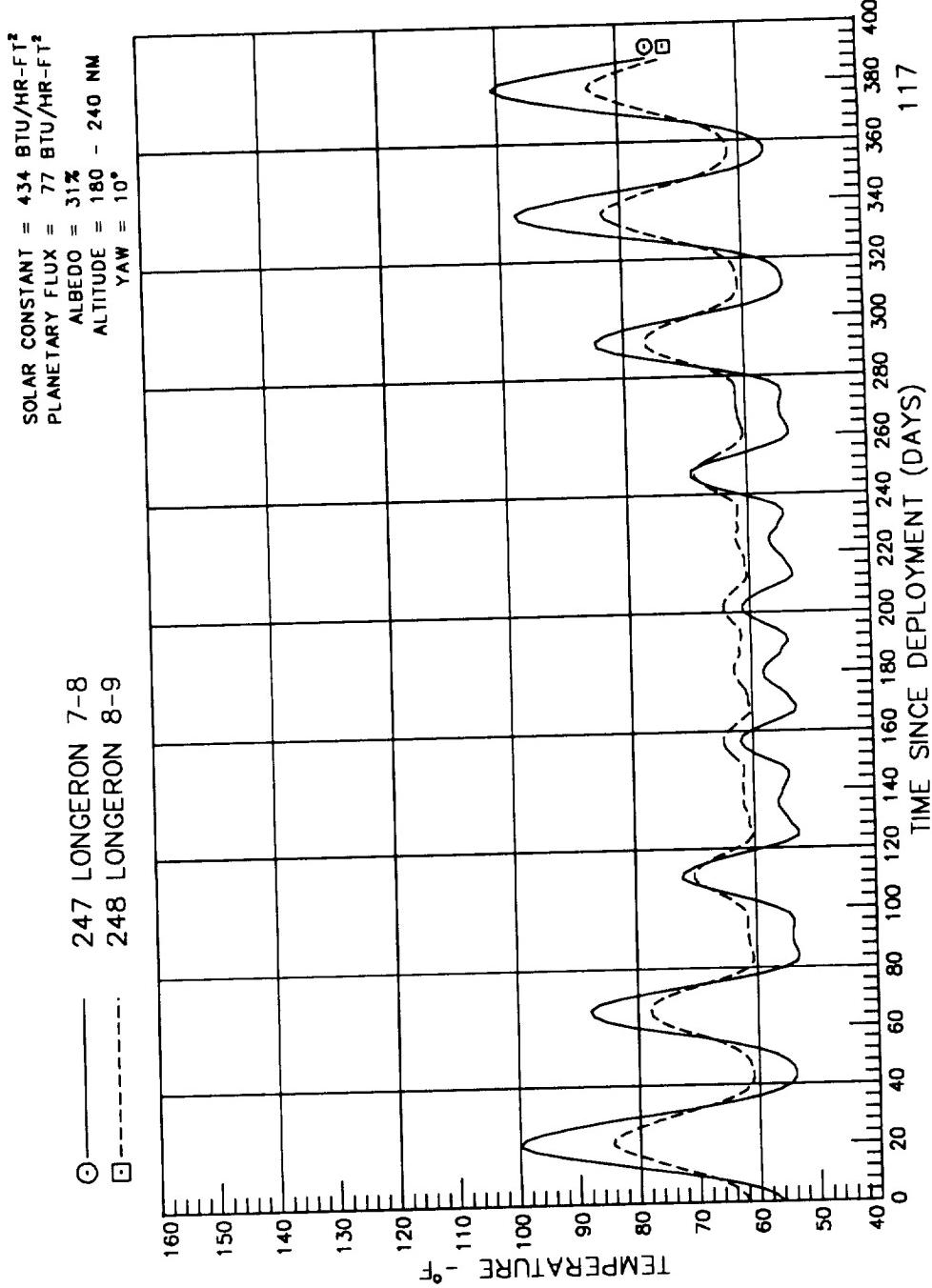
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC A8



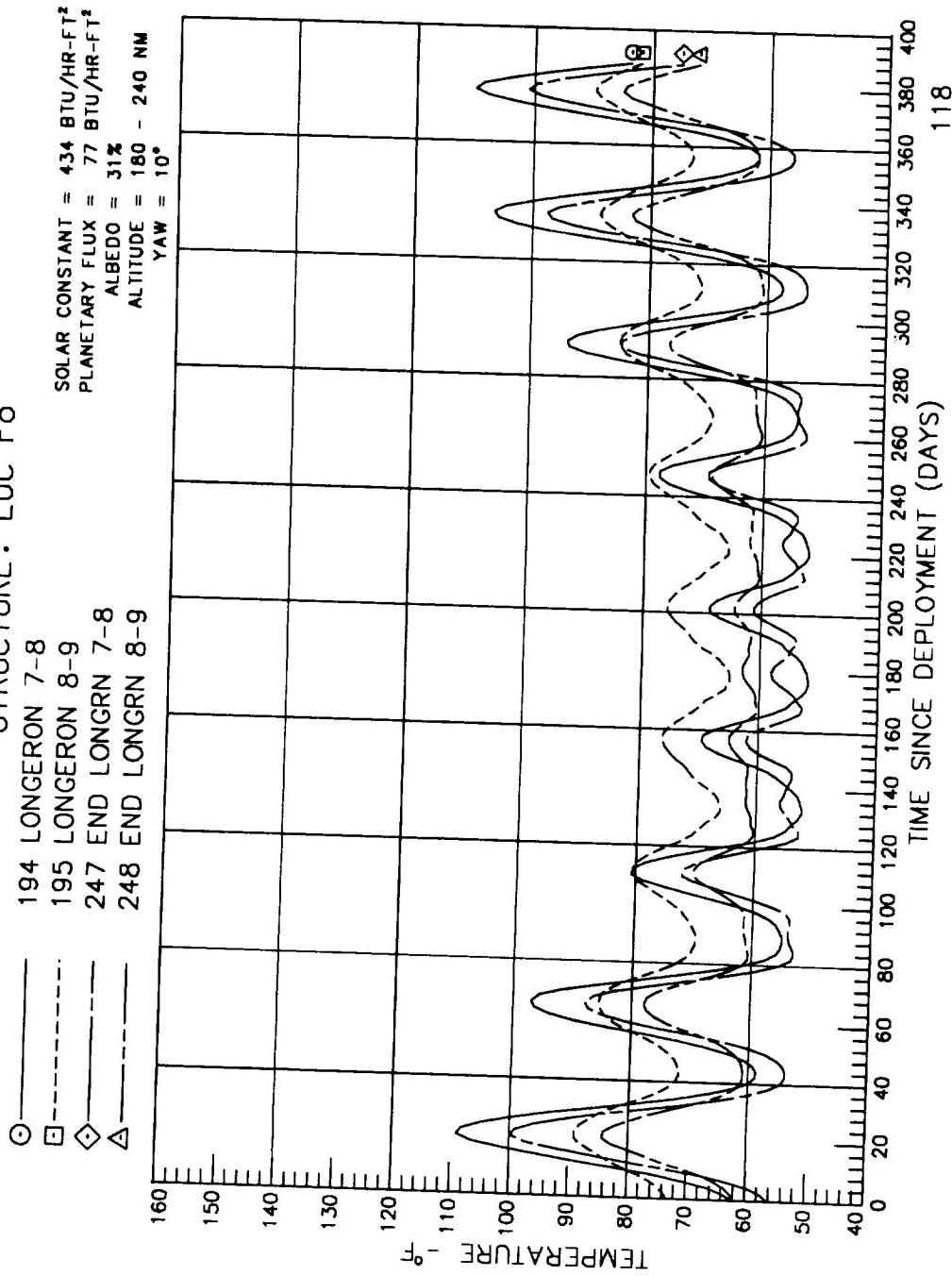
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B8 & C8



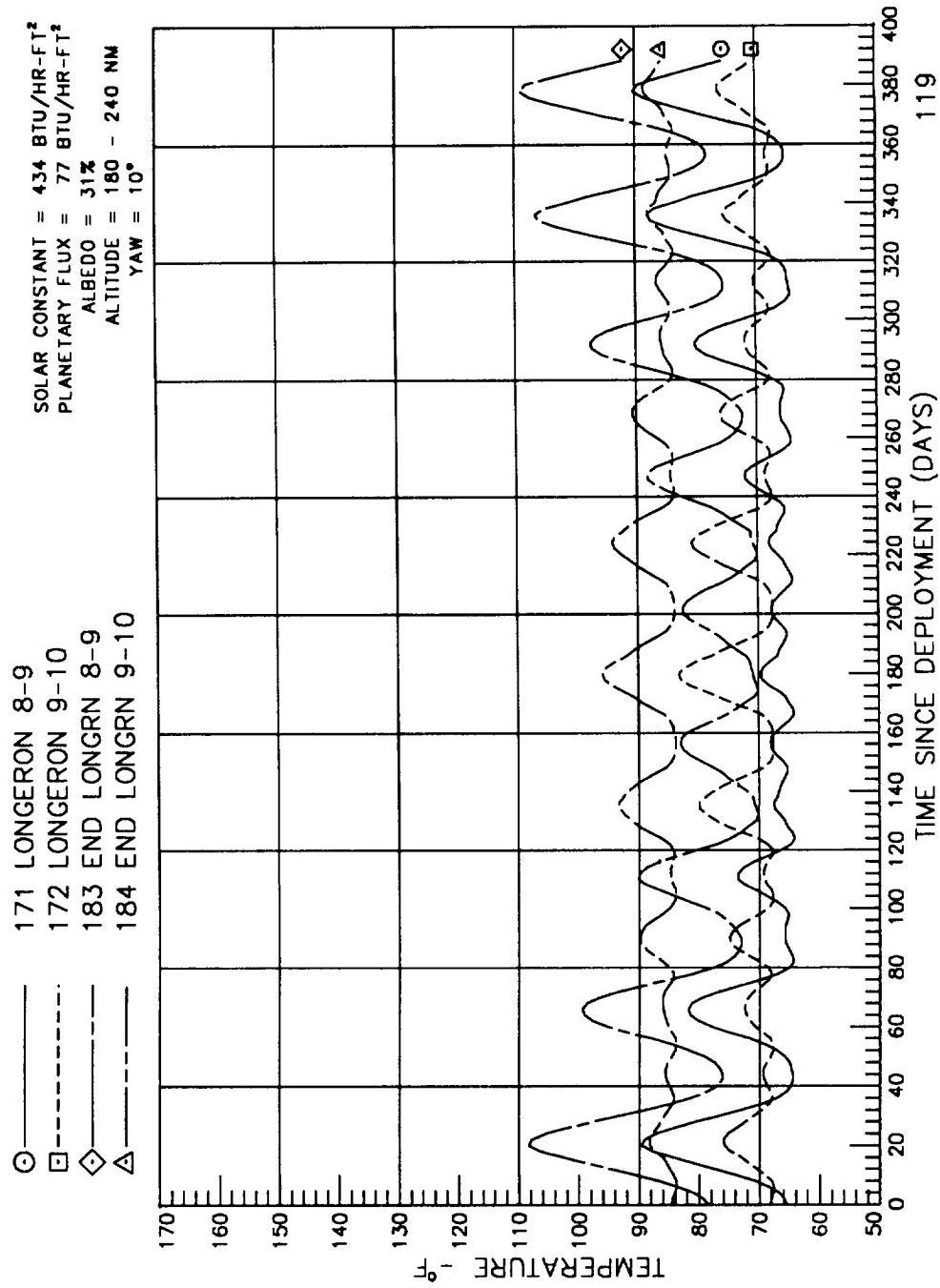
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D8 & E8



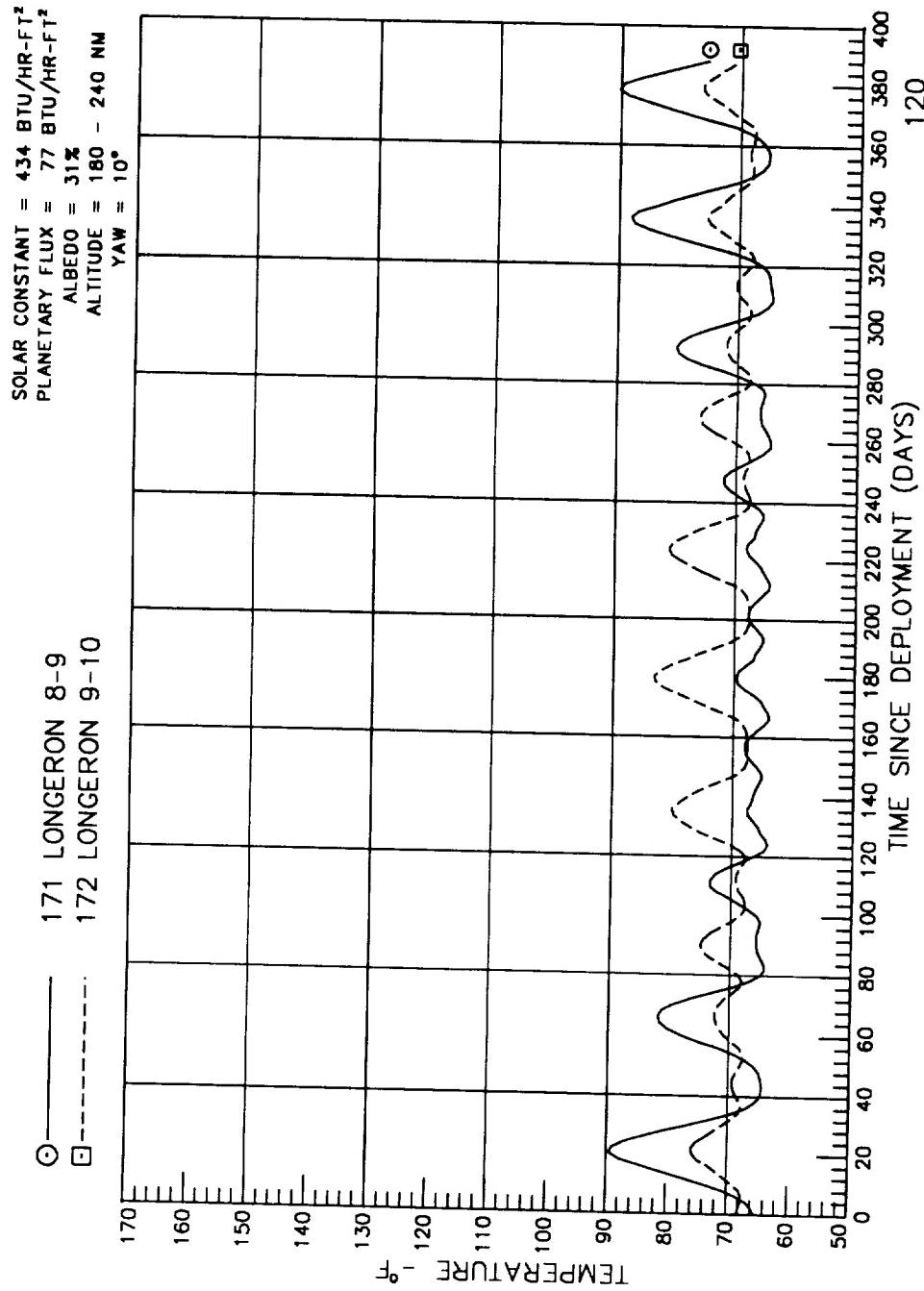
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F8



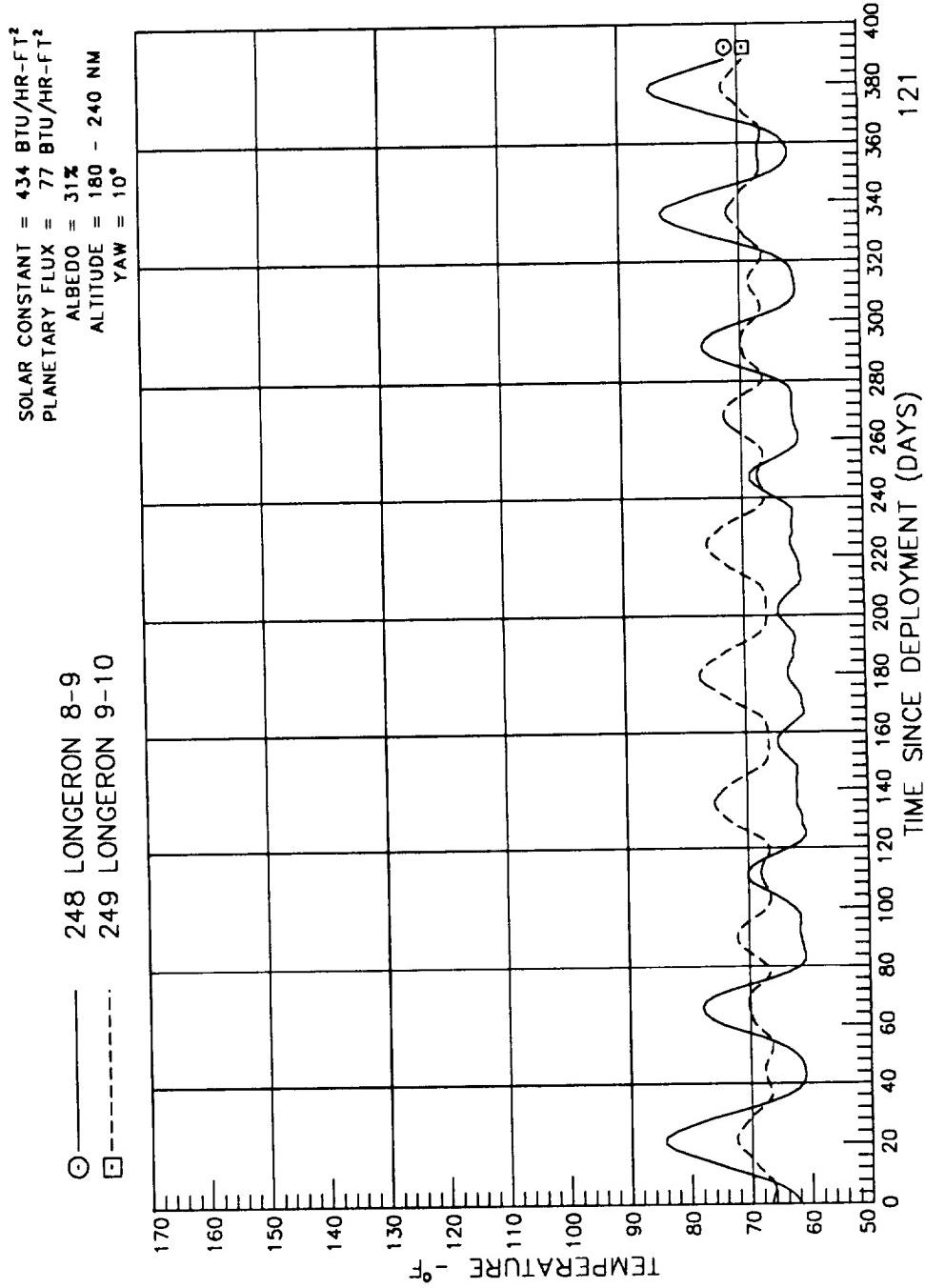
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A9



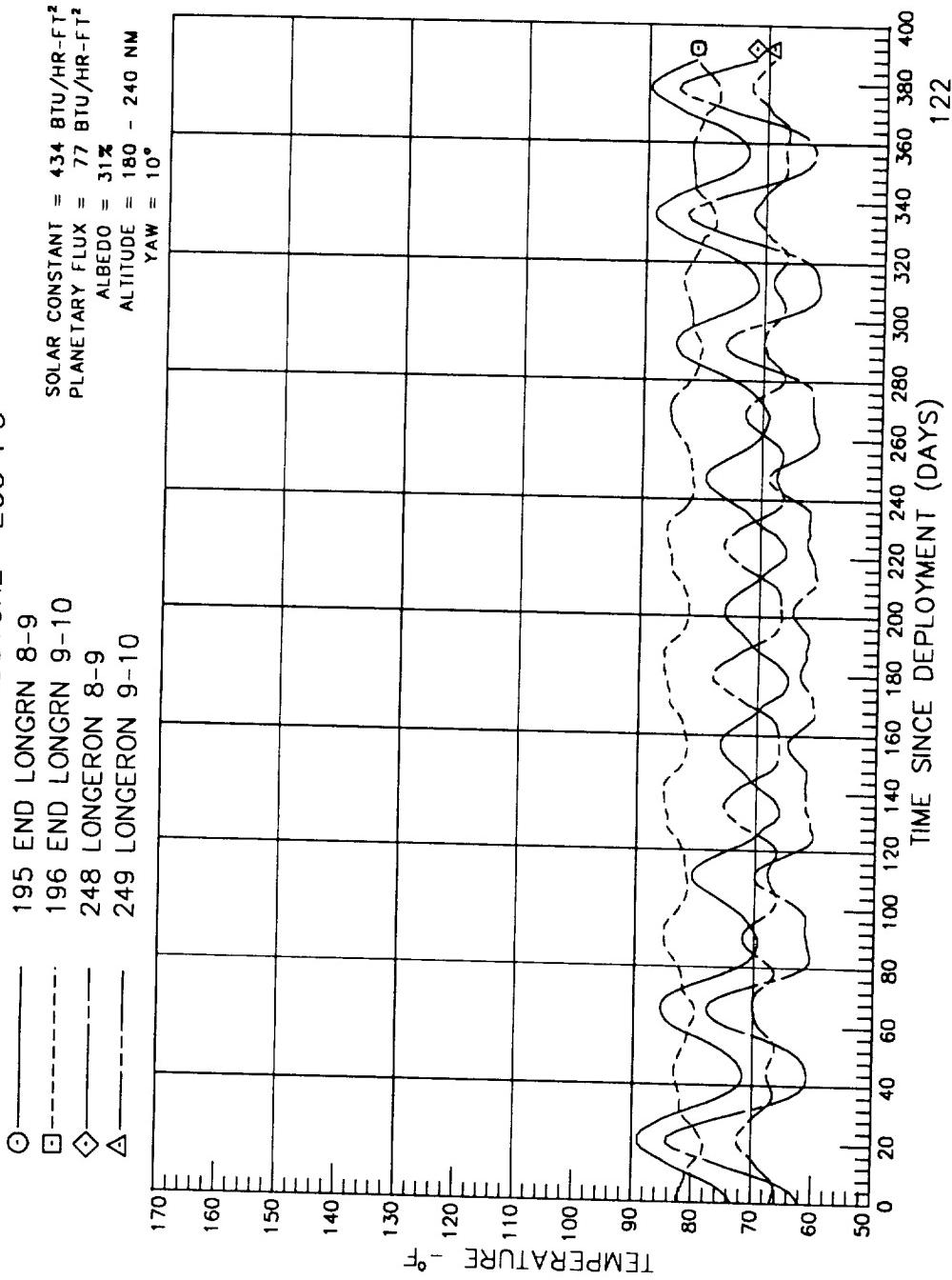
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B9 & C9



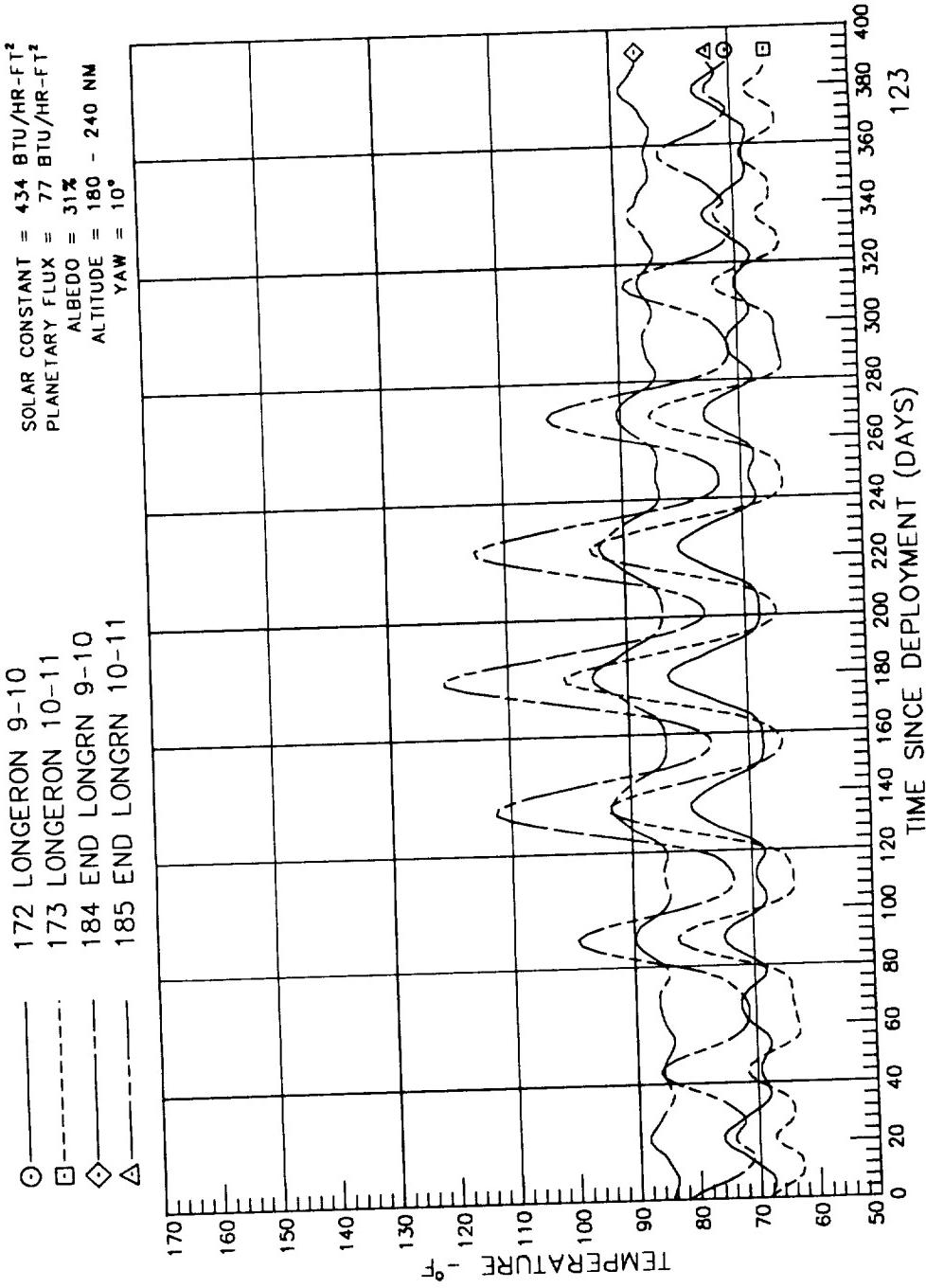
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D9 & E9



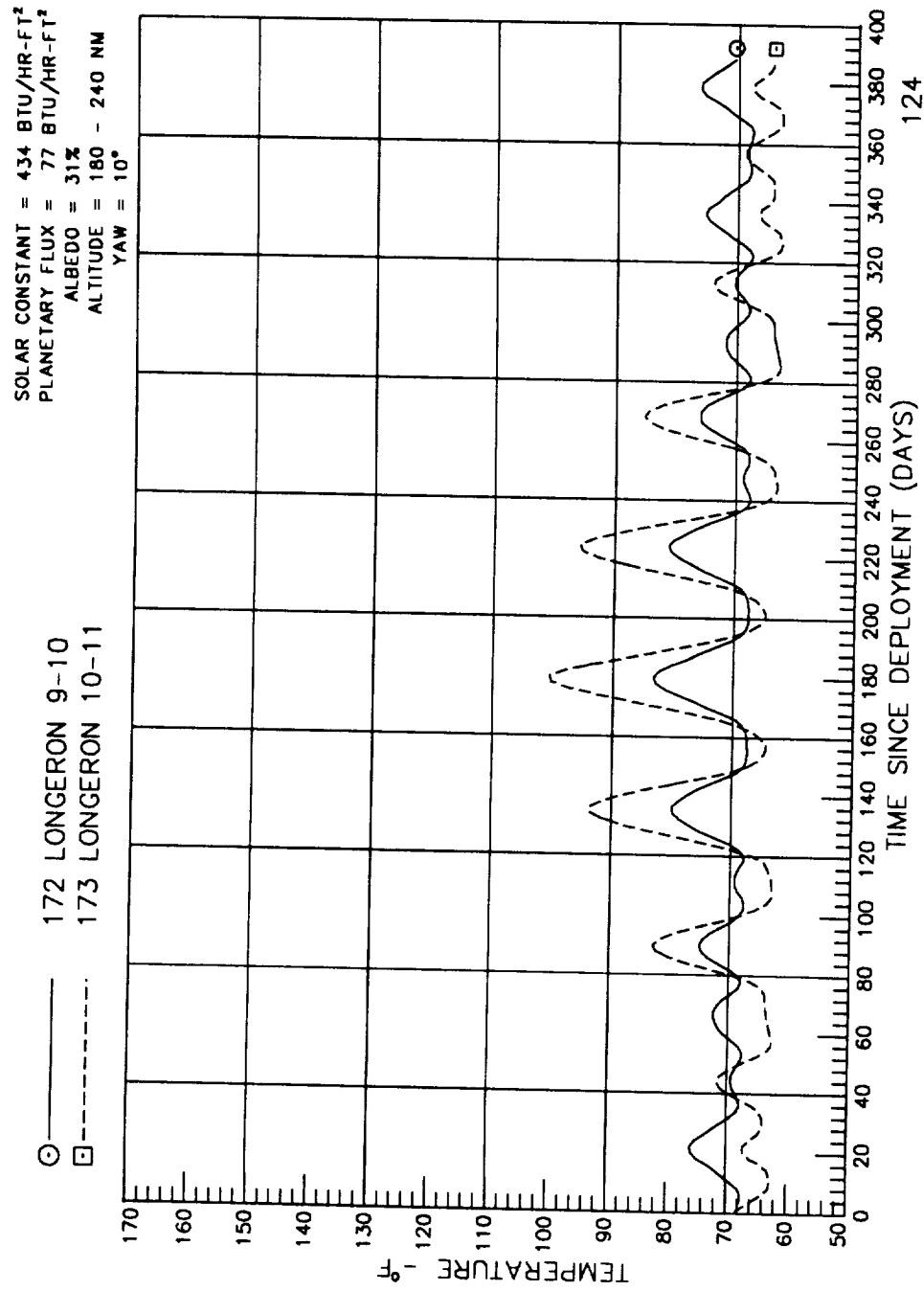
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F9



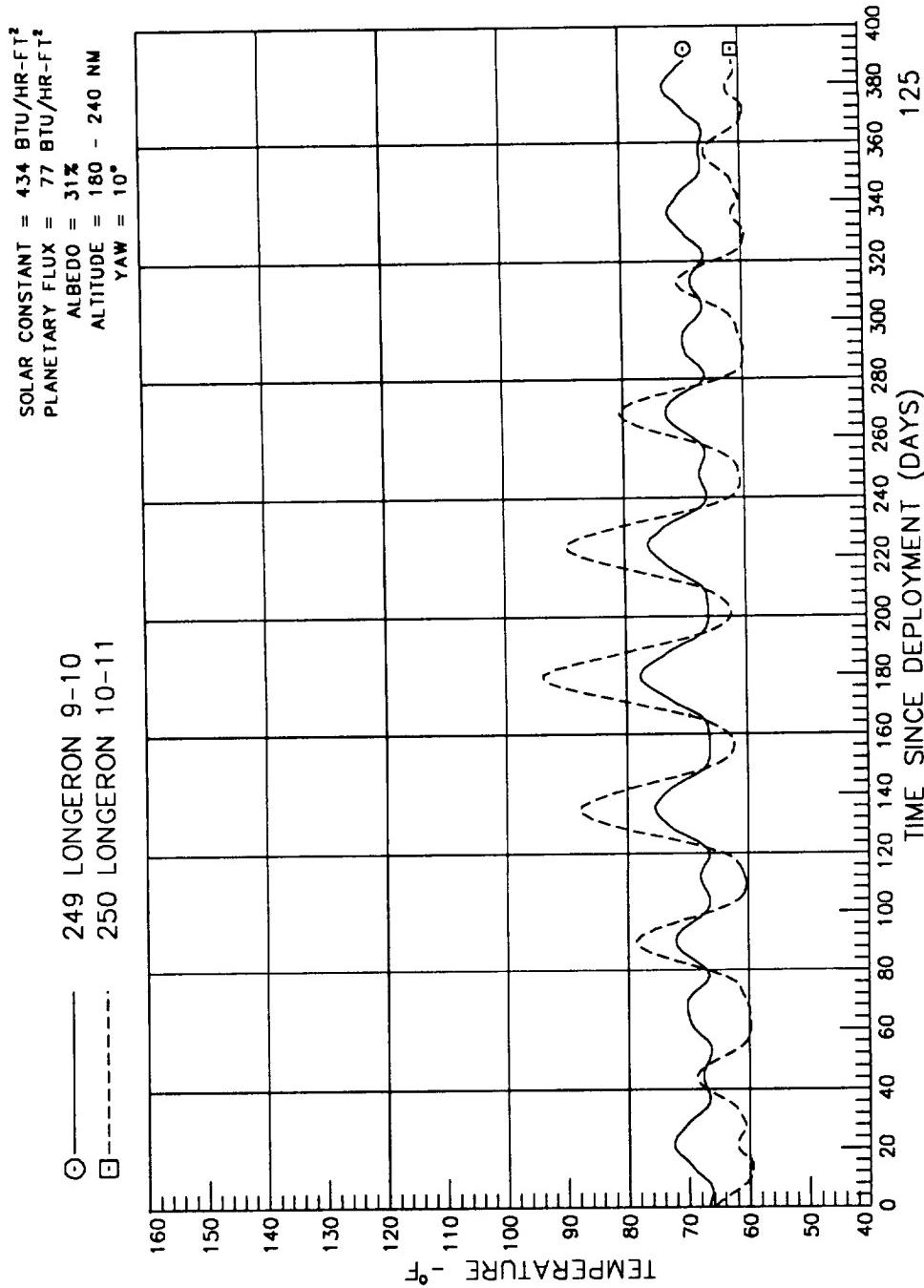
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
STRUCTURE: LOC A10



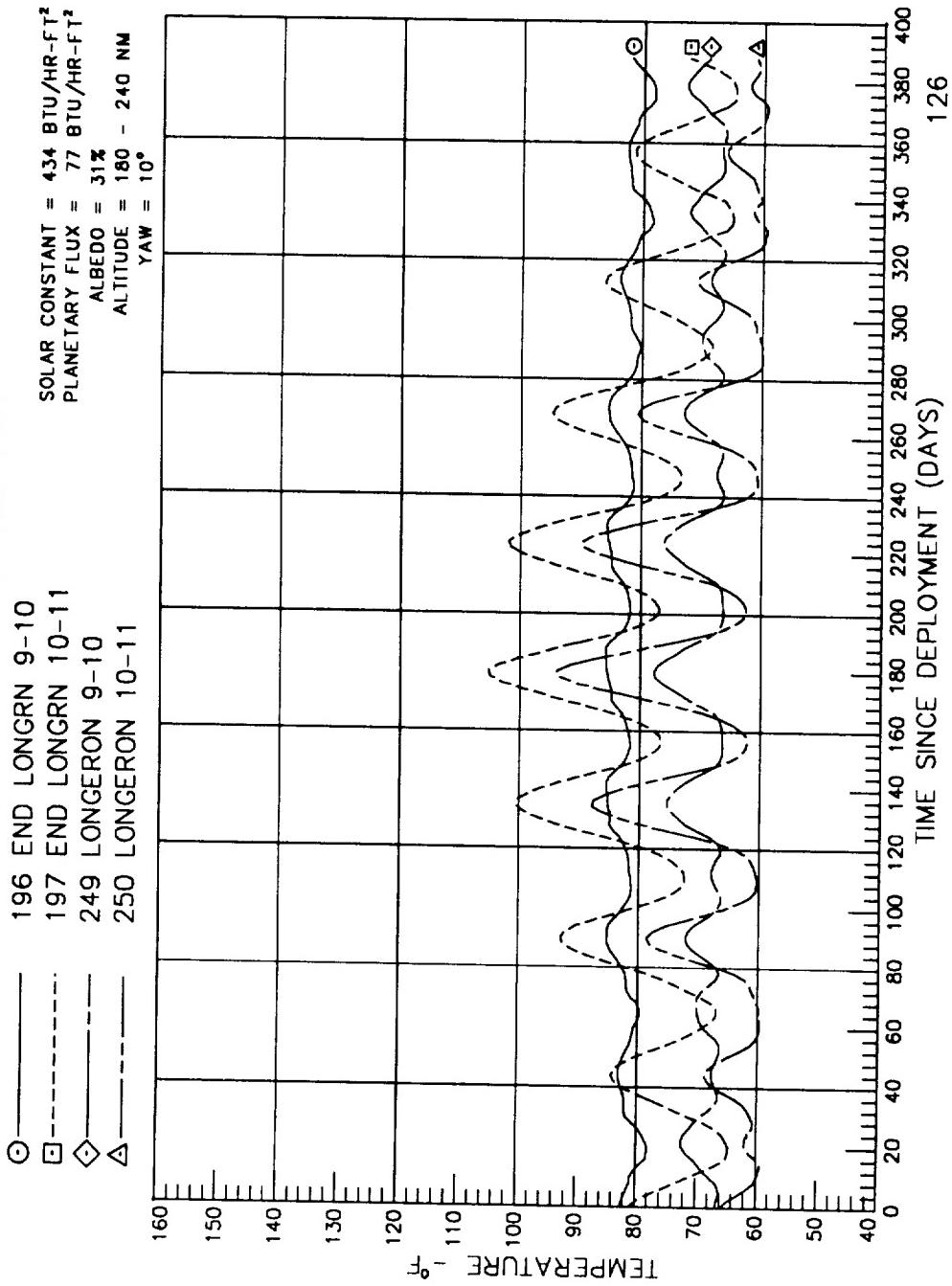
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B10 & C10



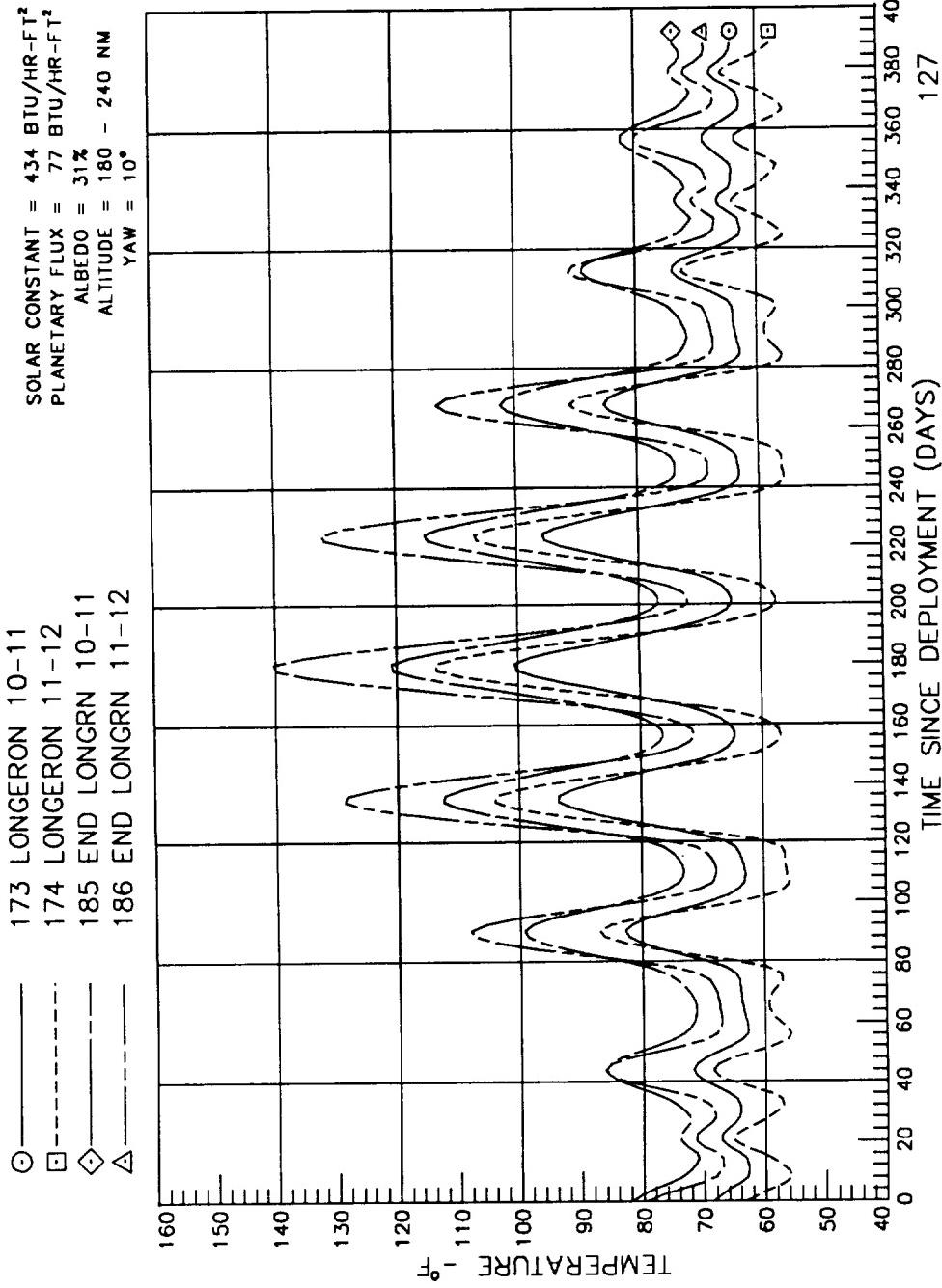
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC D10 & E10



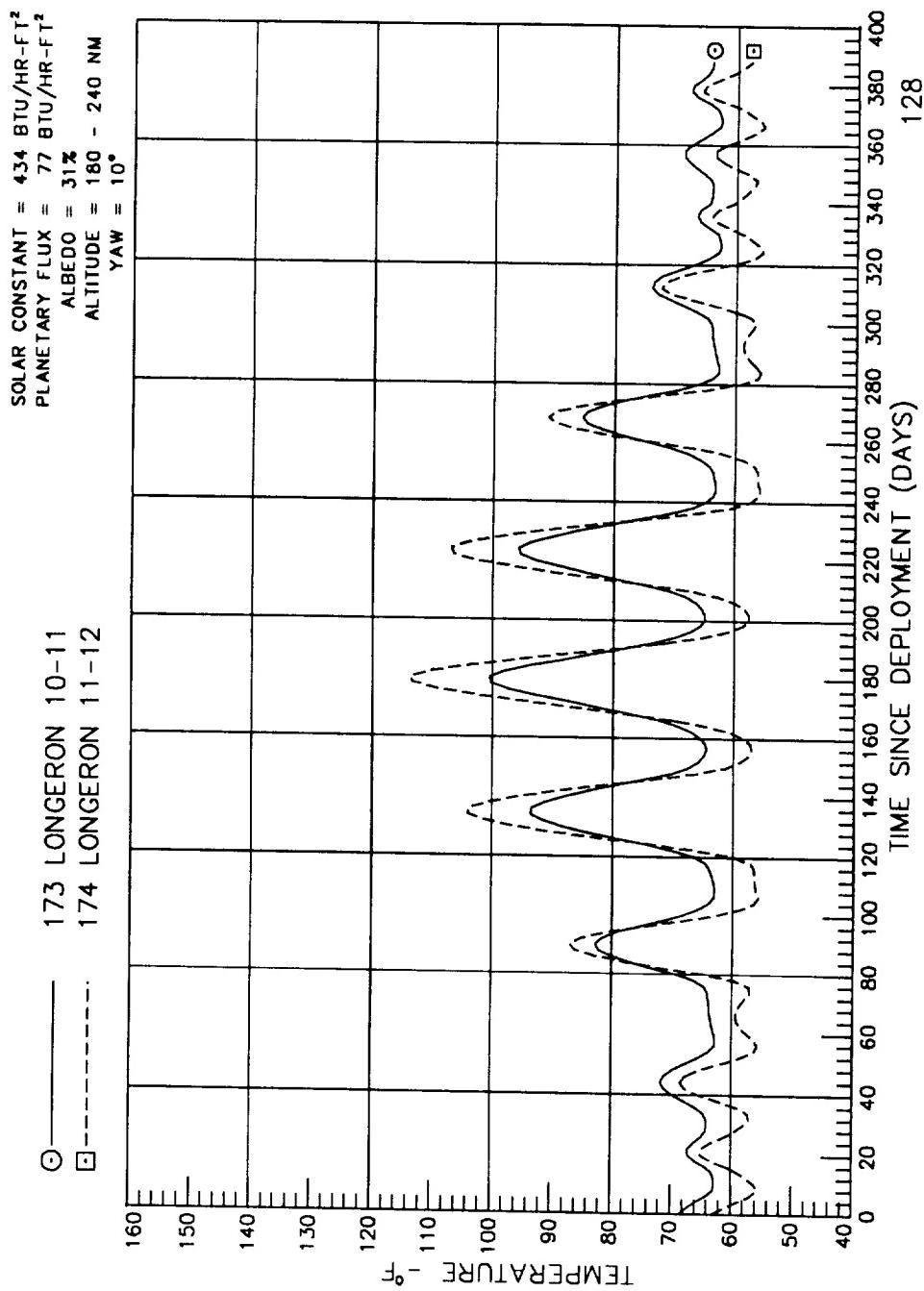
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F10



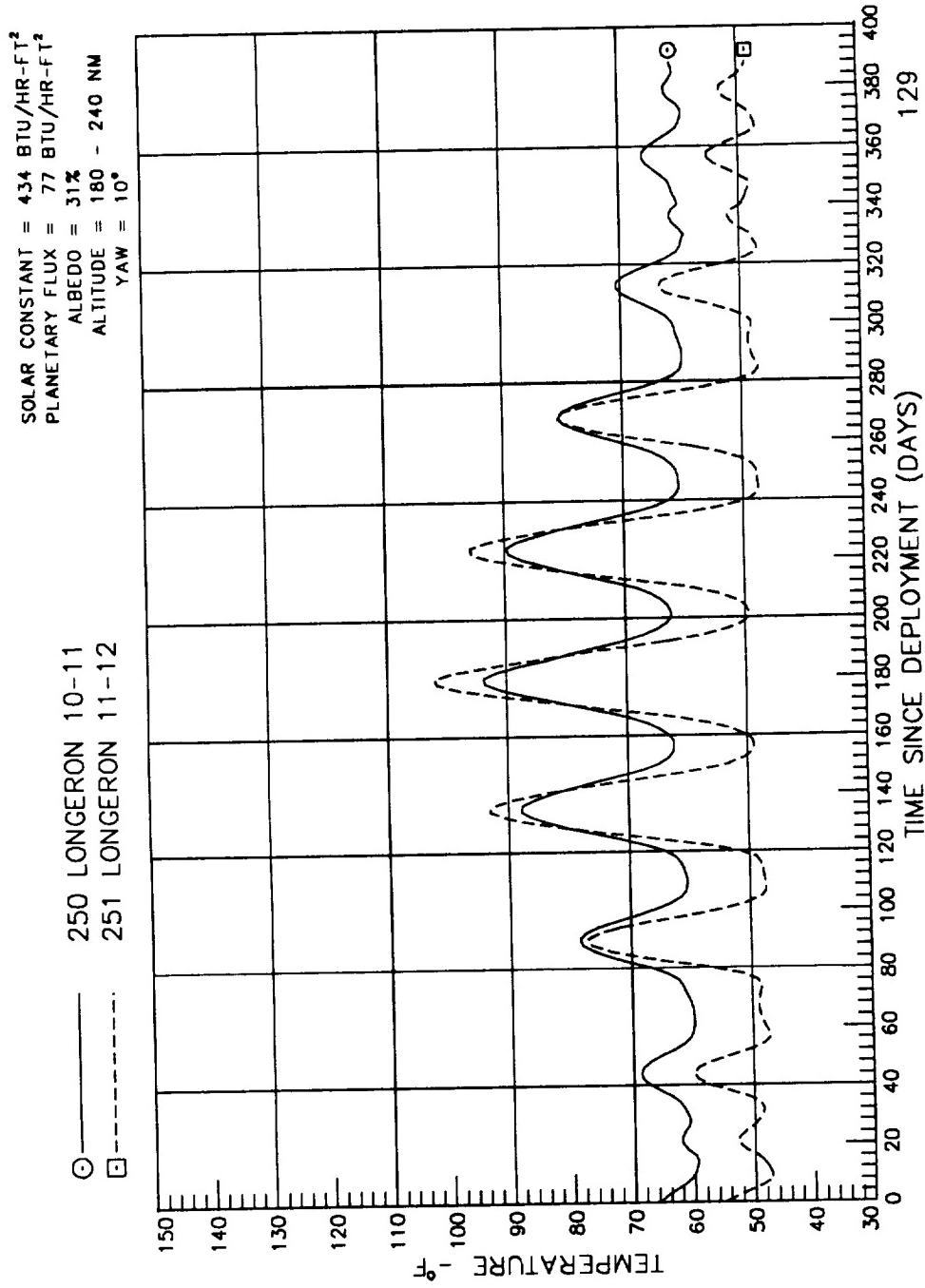
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A11



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B11 & C11



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC D11 & E11

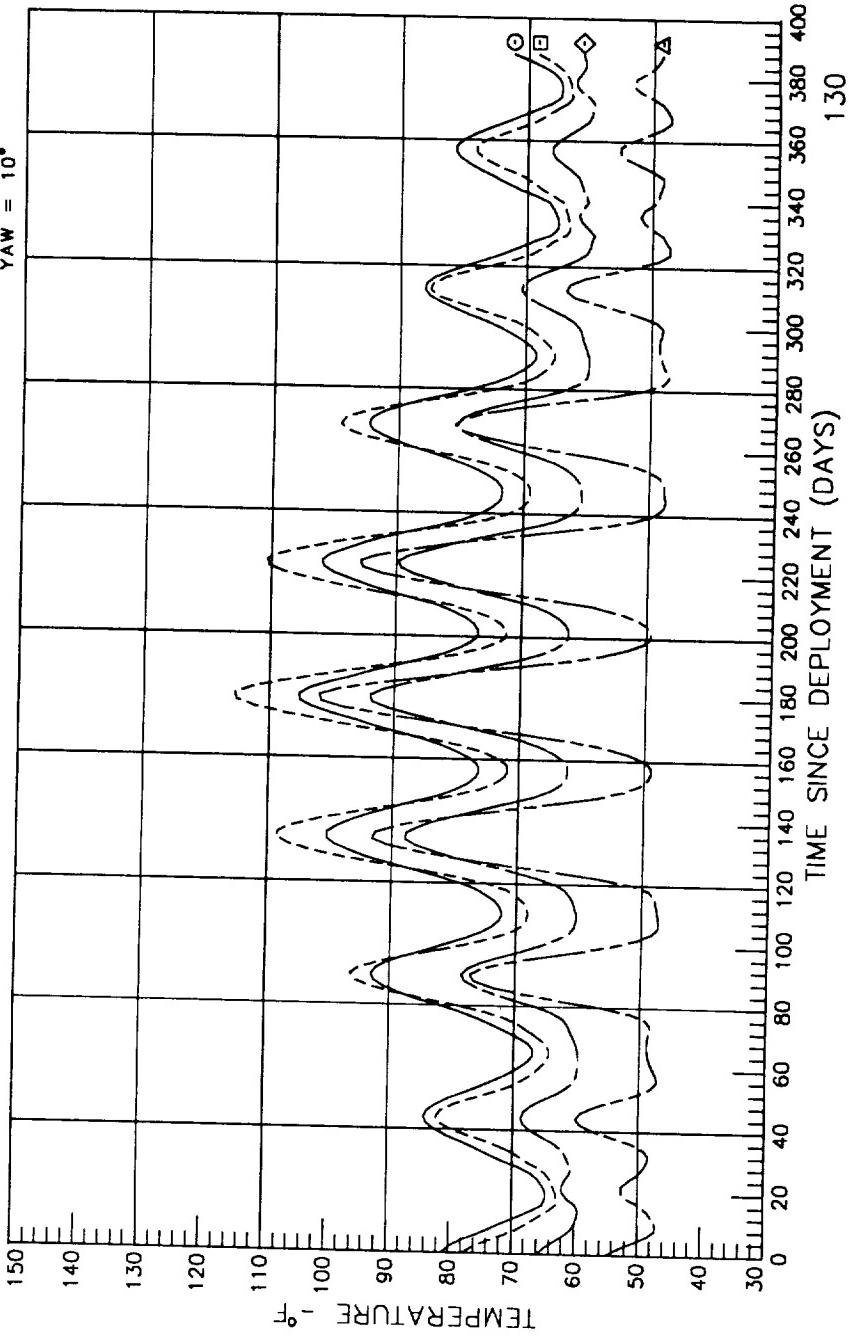


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC F11

○ -----	197 END LONGRN 10-11
□ -----	198 END LONGRN 11-12
◇ -----	250 LONGERON 10-11
△ -----	251 LONGERON 11-12

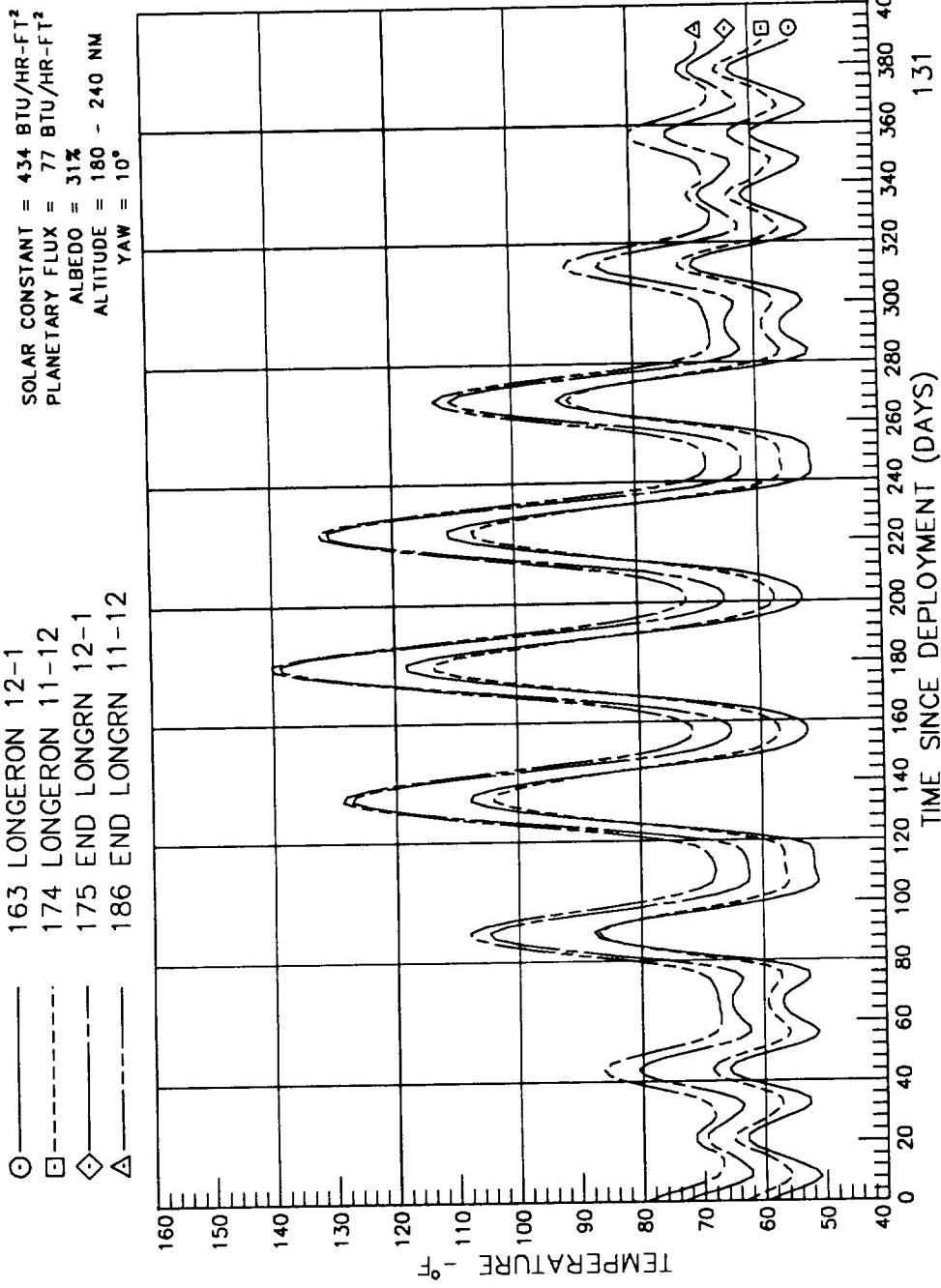
SOLAR CONSTANT = 434 BTU/HR-F²
 PLANETARY FLUX = 77 BTU/HR-F²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

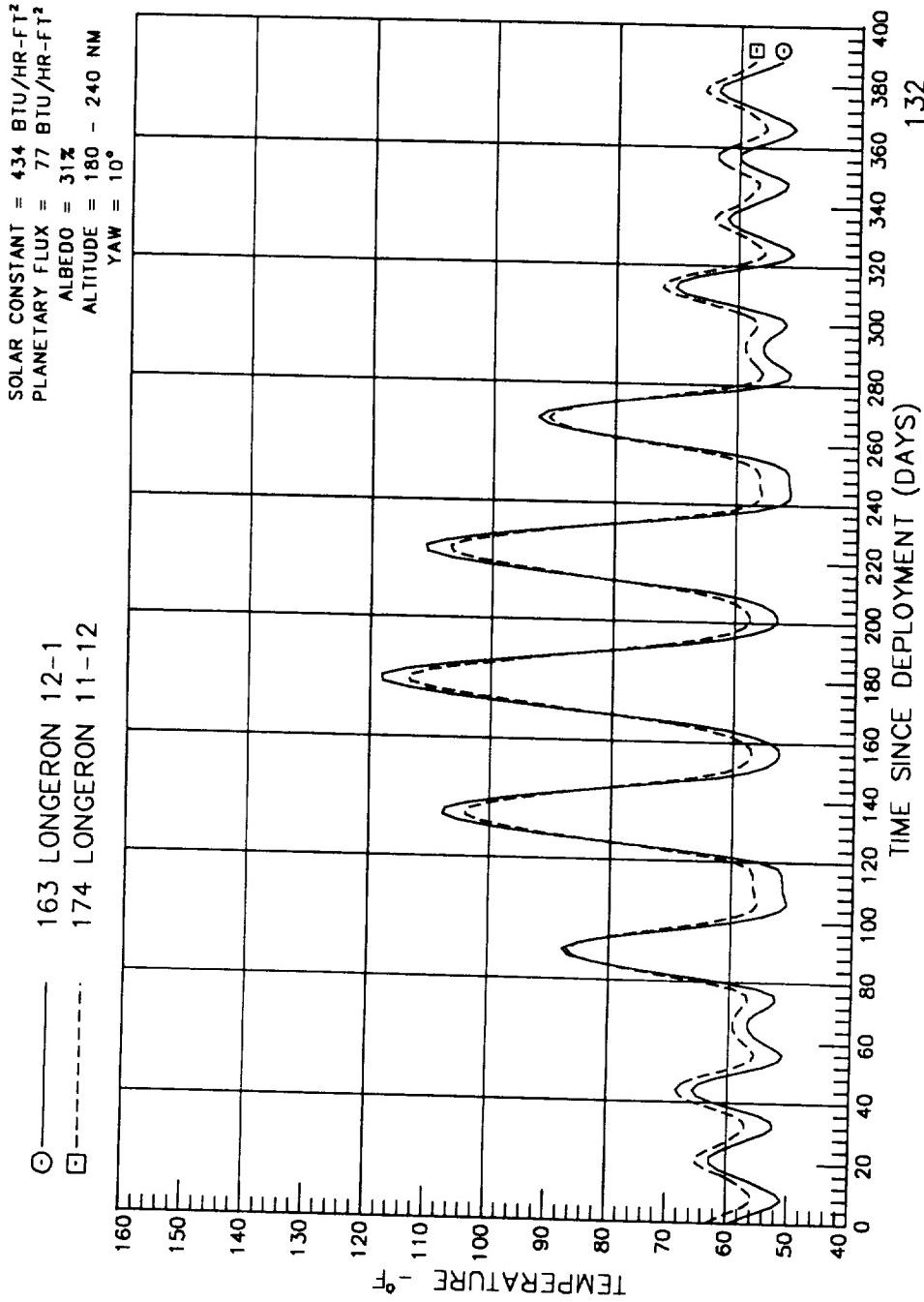


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC A12

○	163 LONGERON 12-1
□	174 LONGERON 11-12
◇	175 END LONGRN 12-1
△	186 END LONGRN 11-12



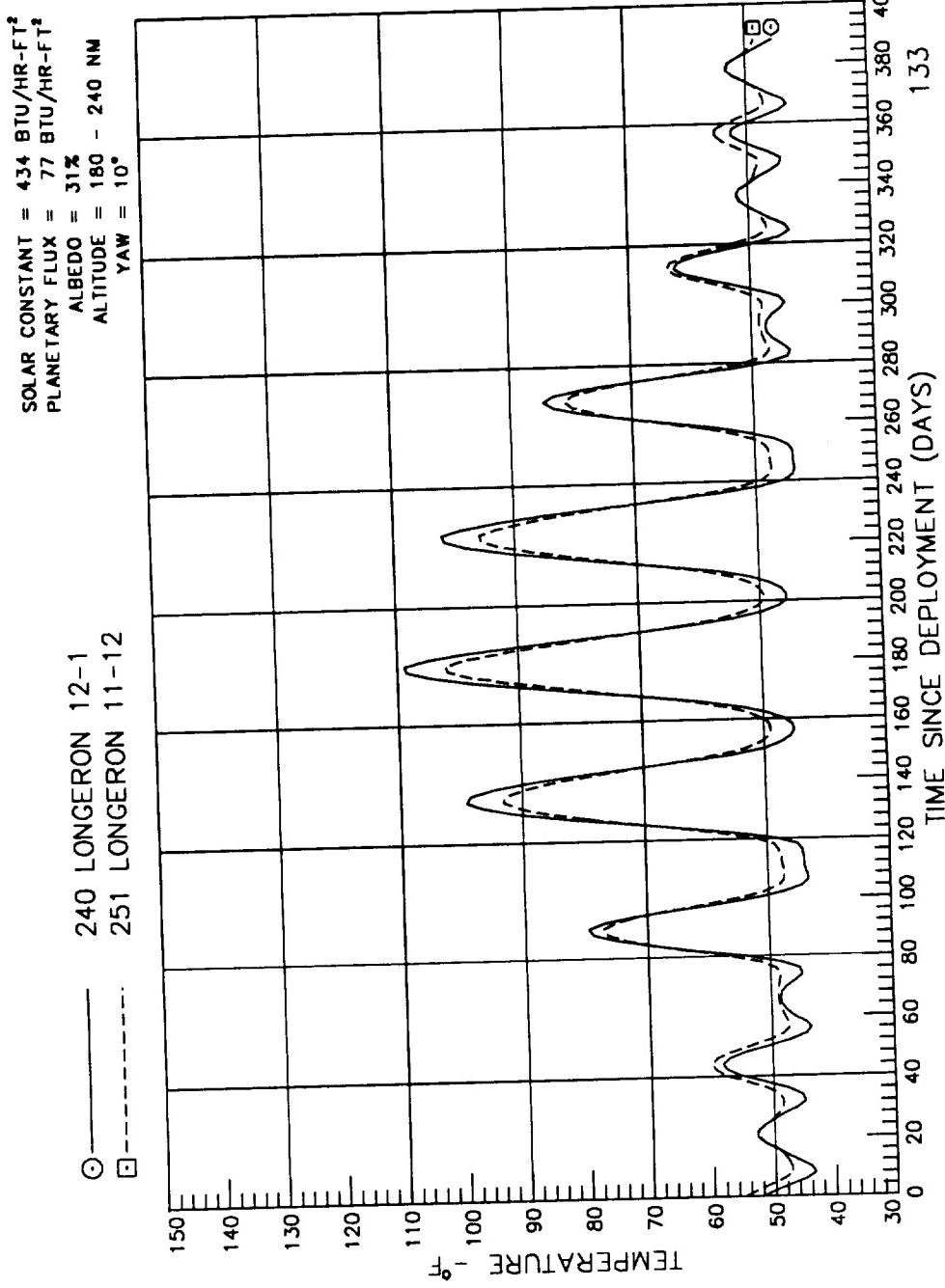
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC B12 & C12



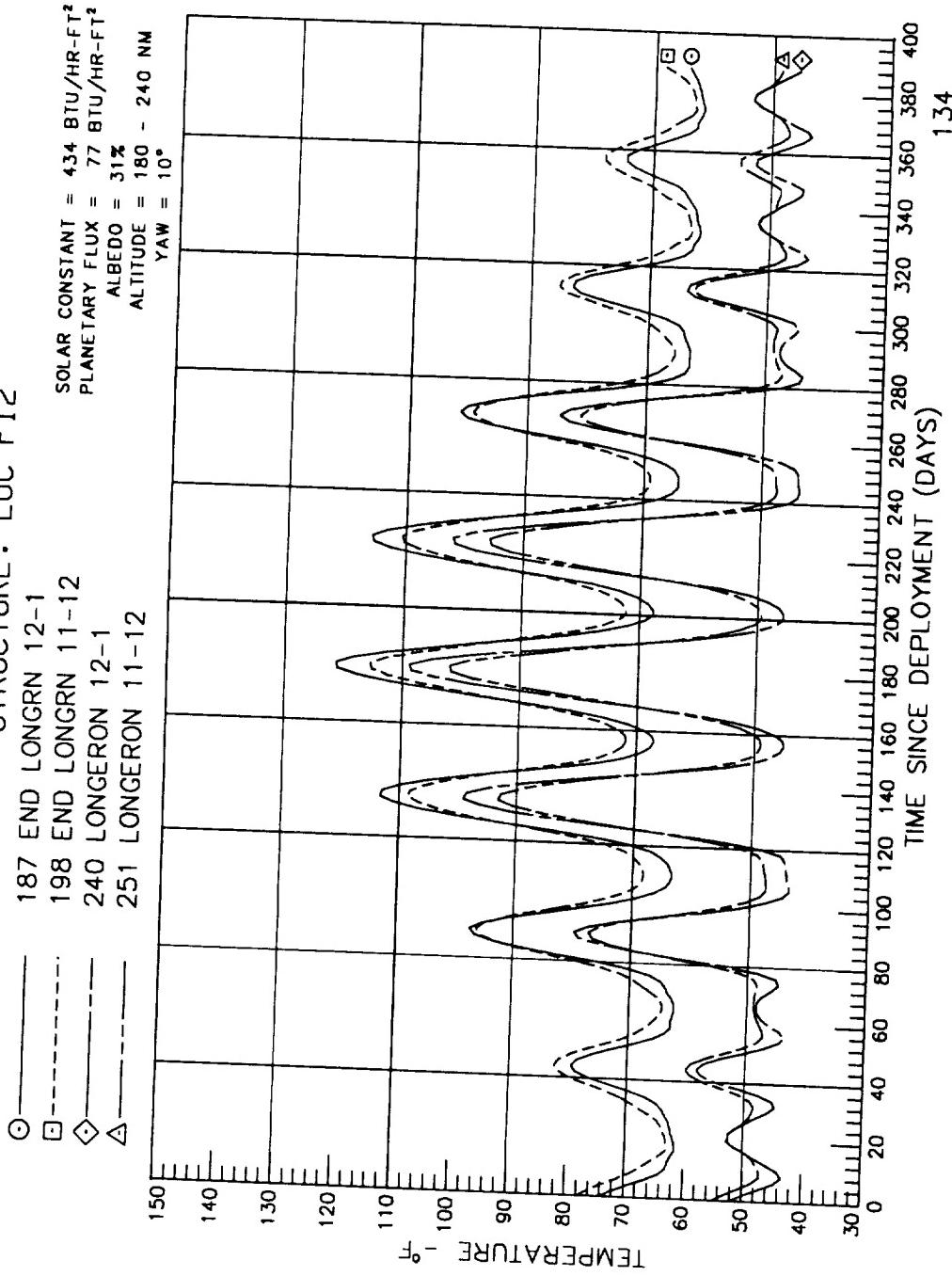
D - 132

C - 6

LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC D12 & E12



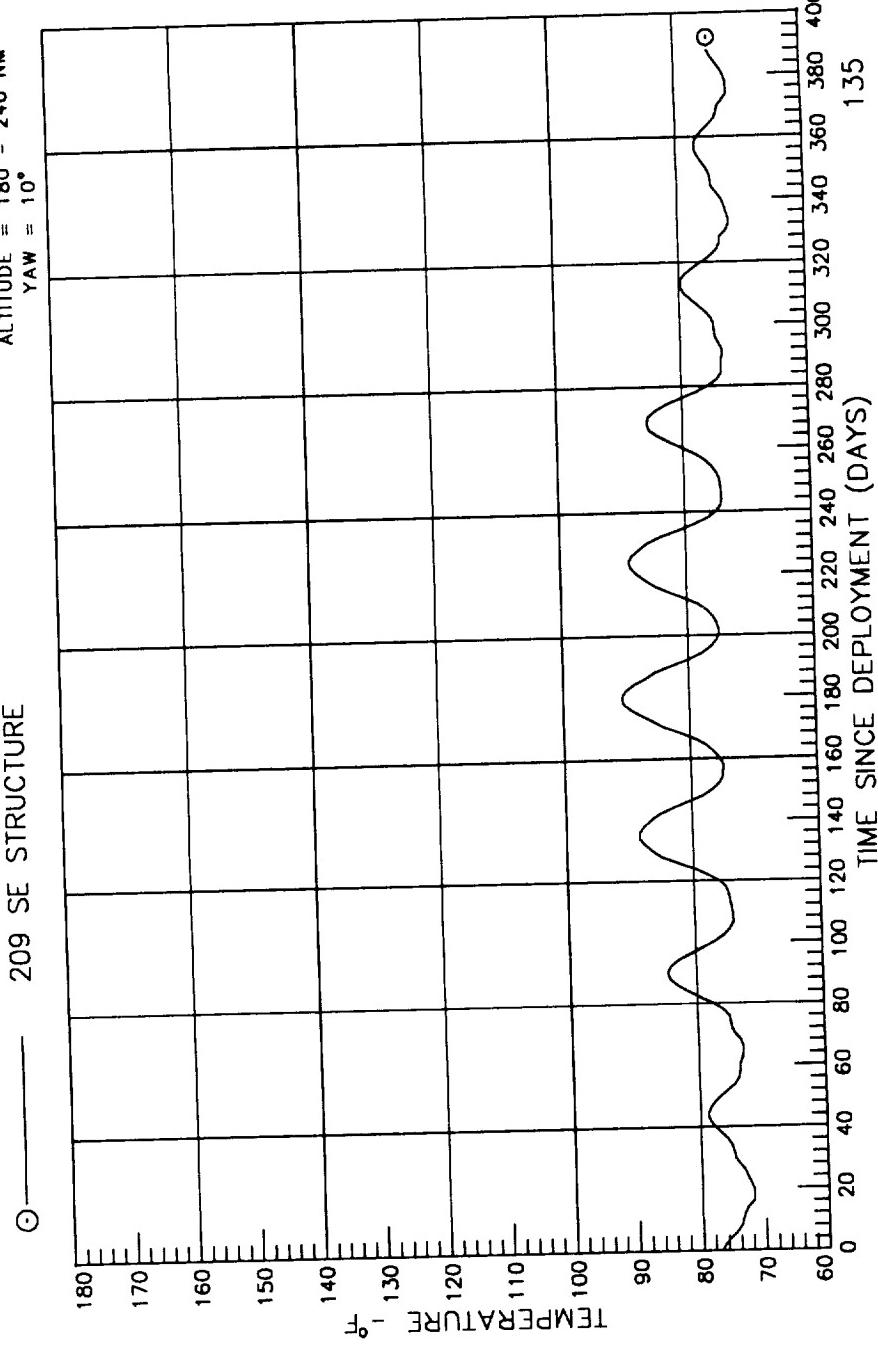
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
STRUCTURE: LOC F12



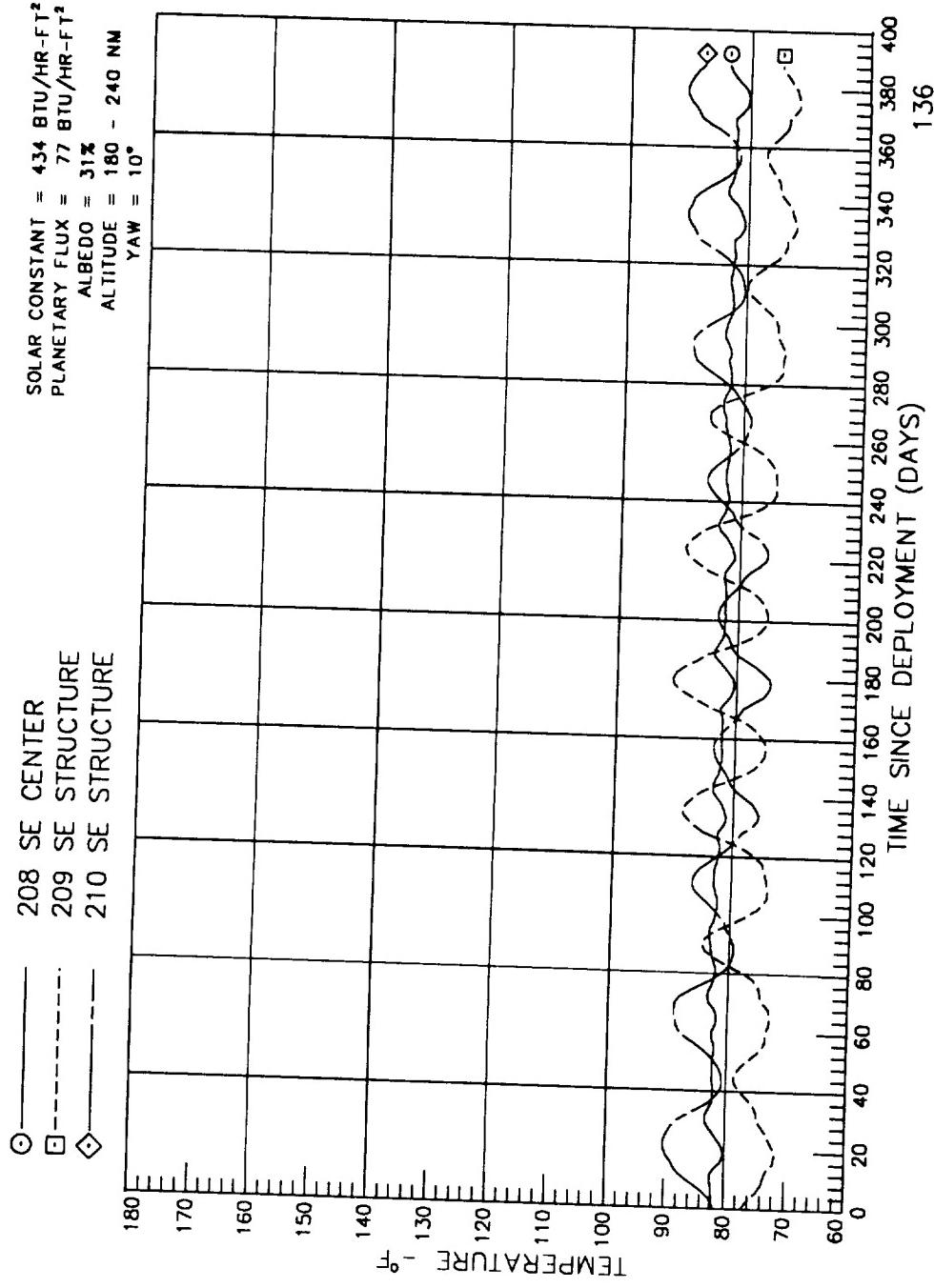
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H1

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H3



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H5

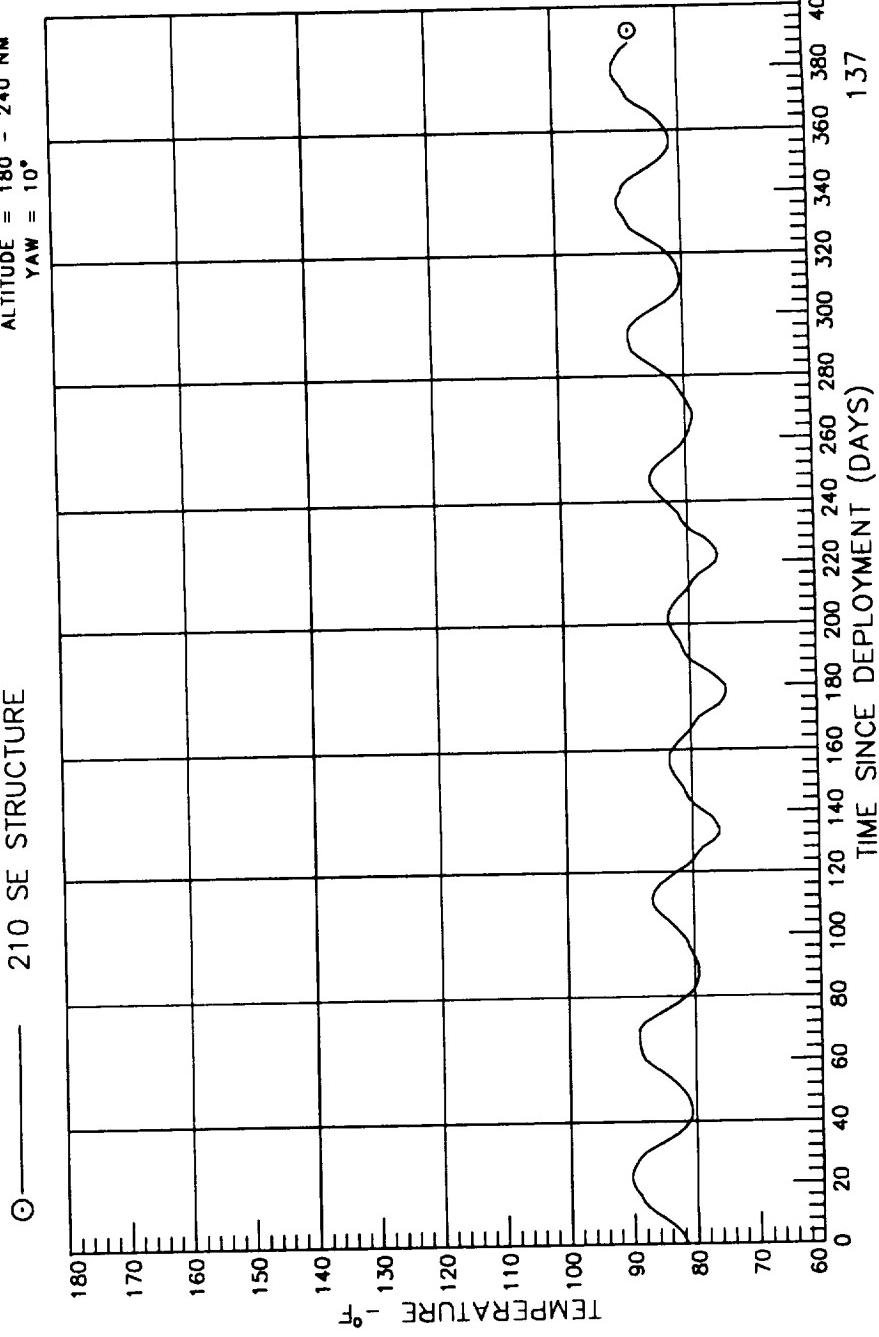
SOLAR CONSTANT = 434 BTU/HR-F²

PLANETARY FLUX = 77 BTU/HR-F²

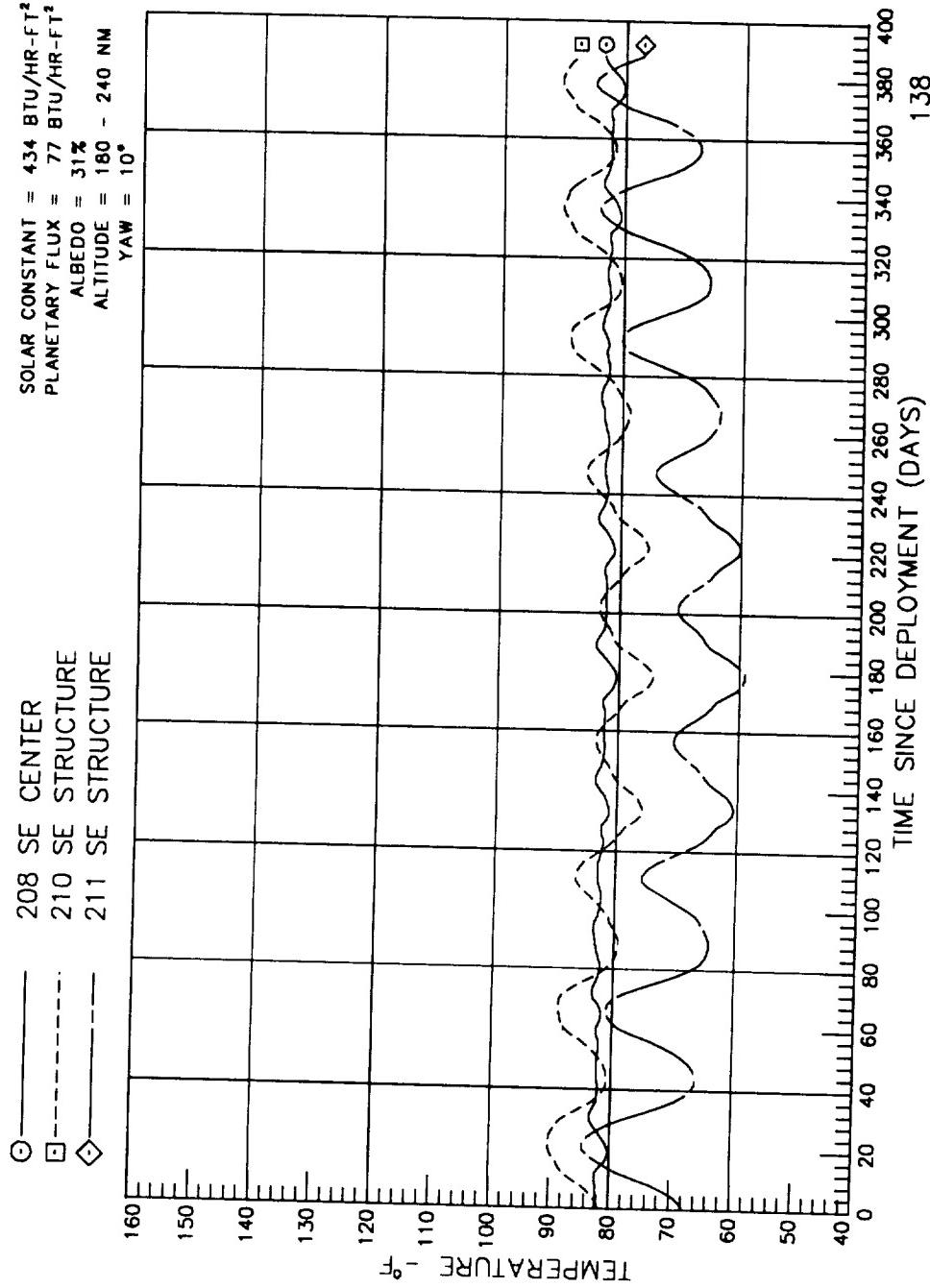
ALBEDO = 31%

ALTITUDE = 180 - 240 NM

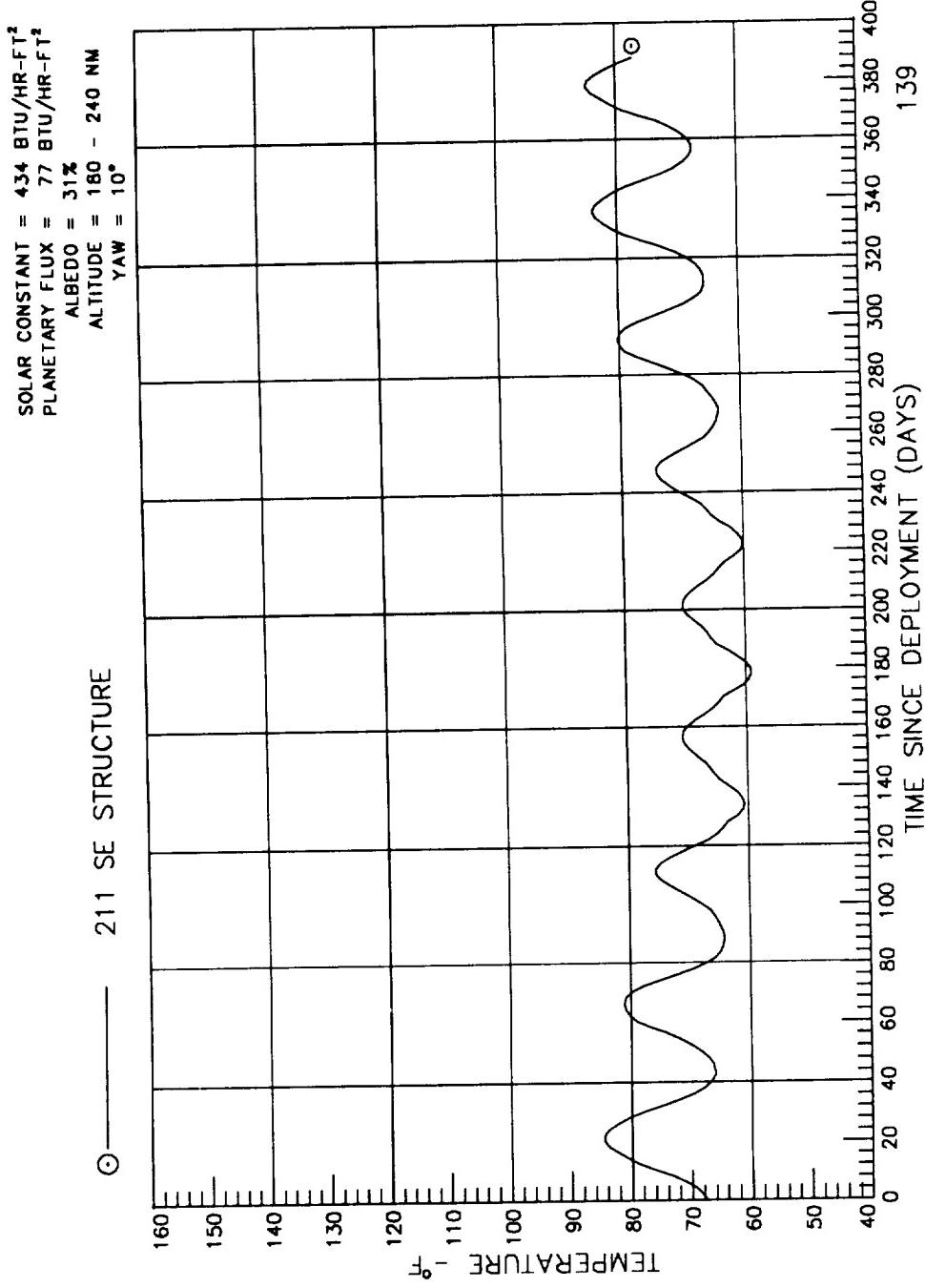
YAW = 10°



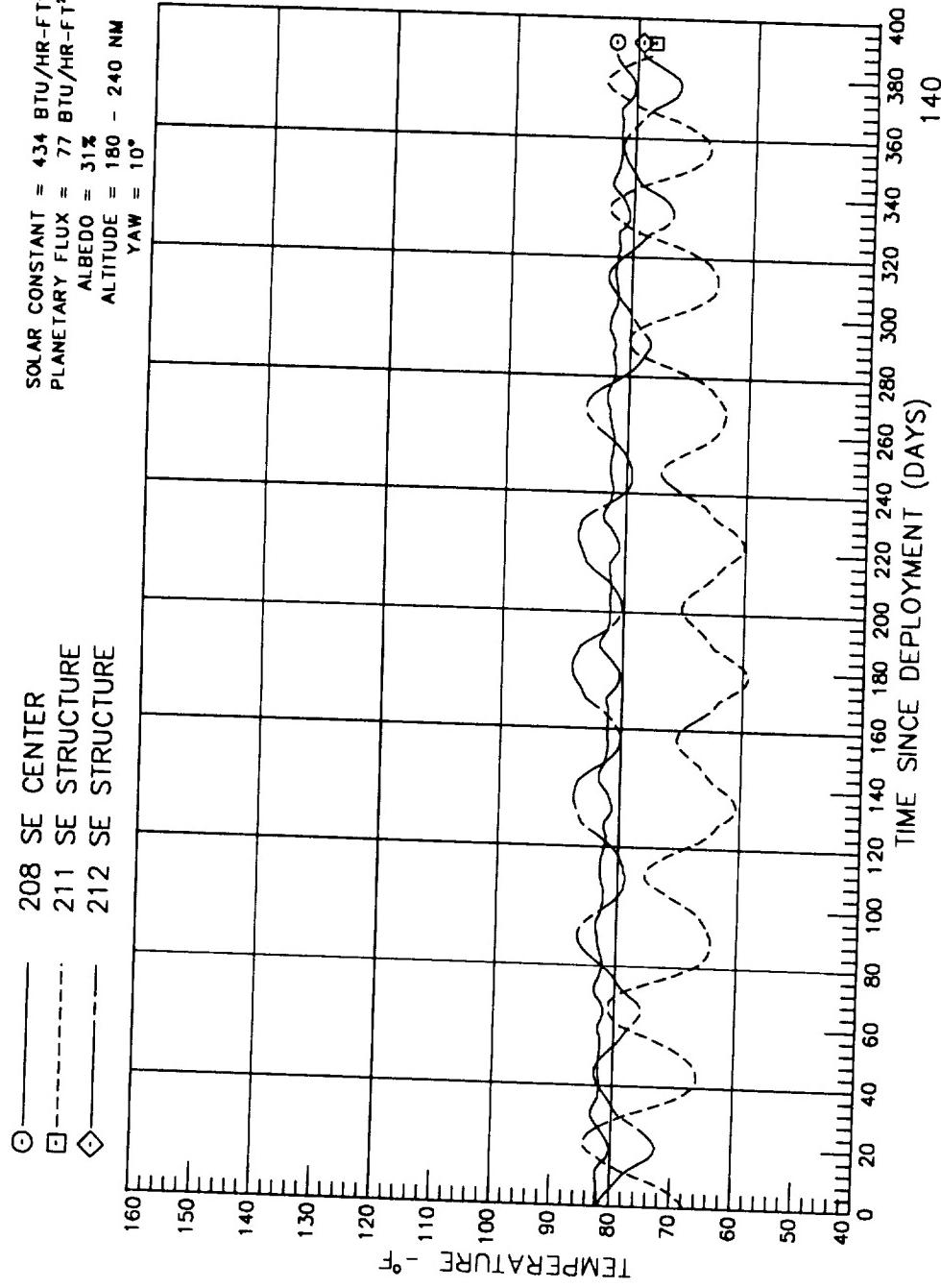
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H6



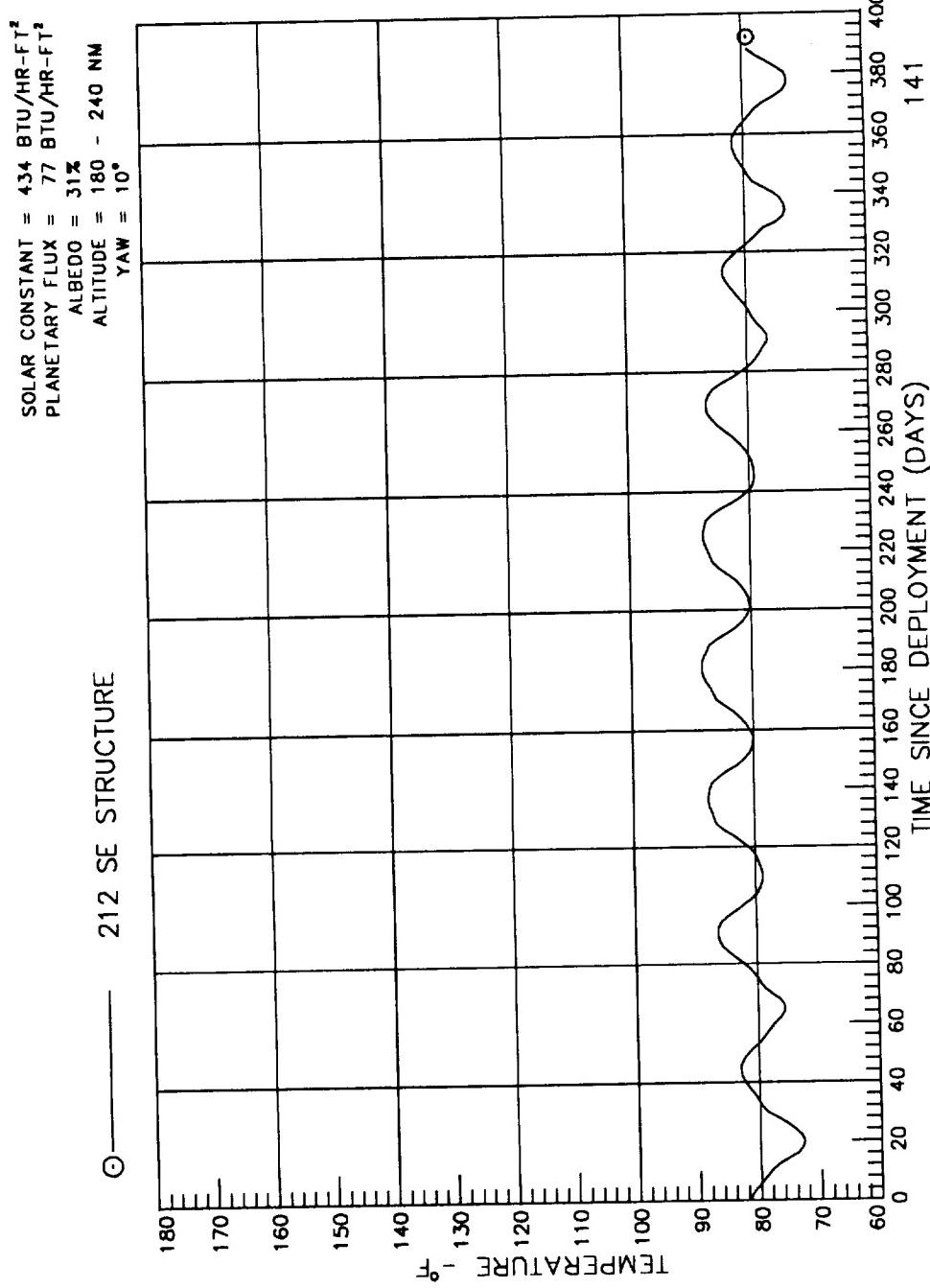
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC H7



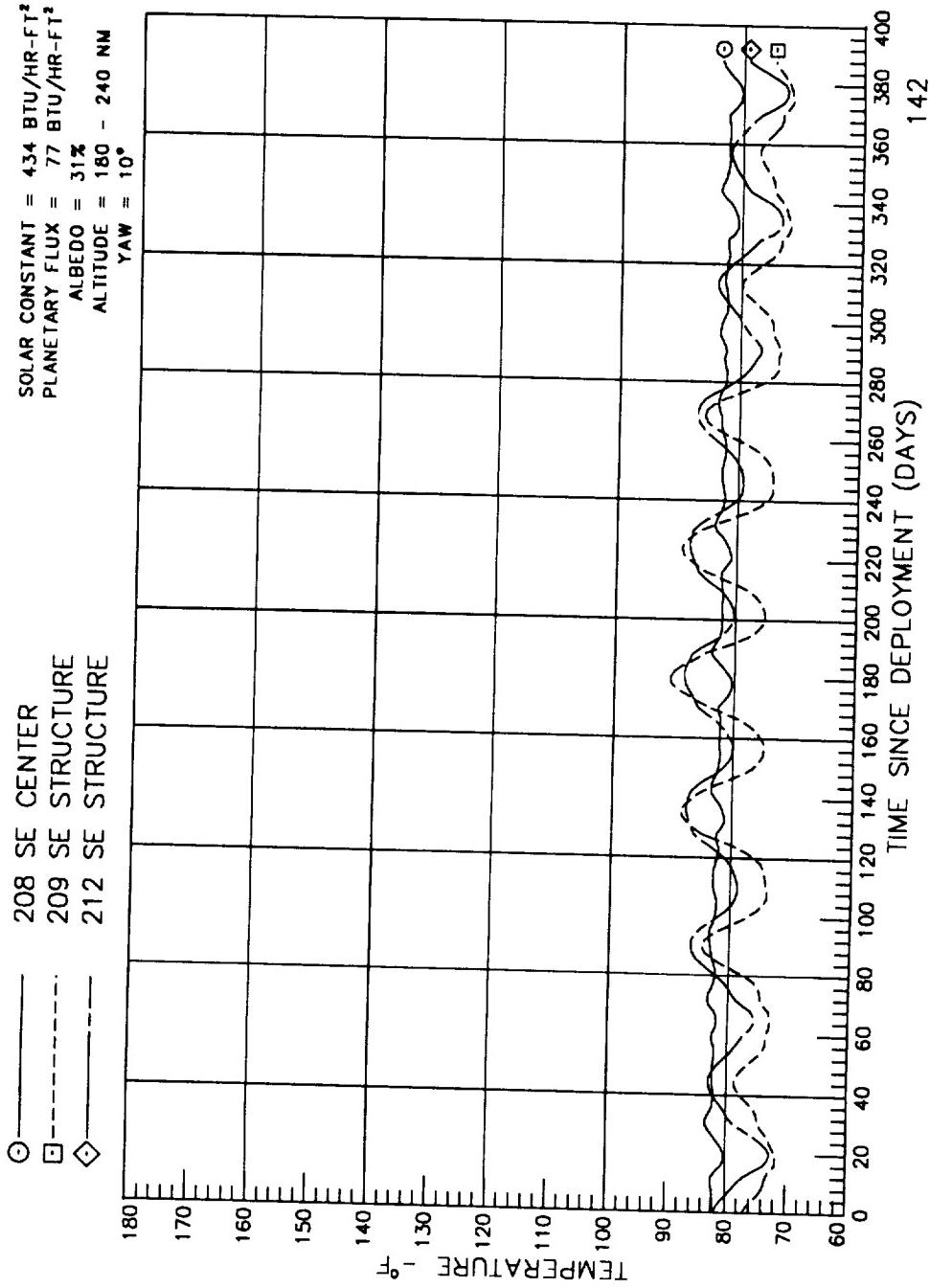
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H9



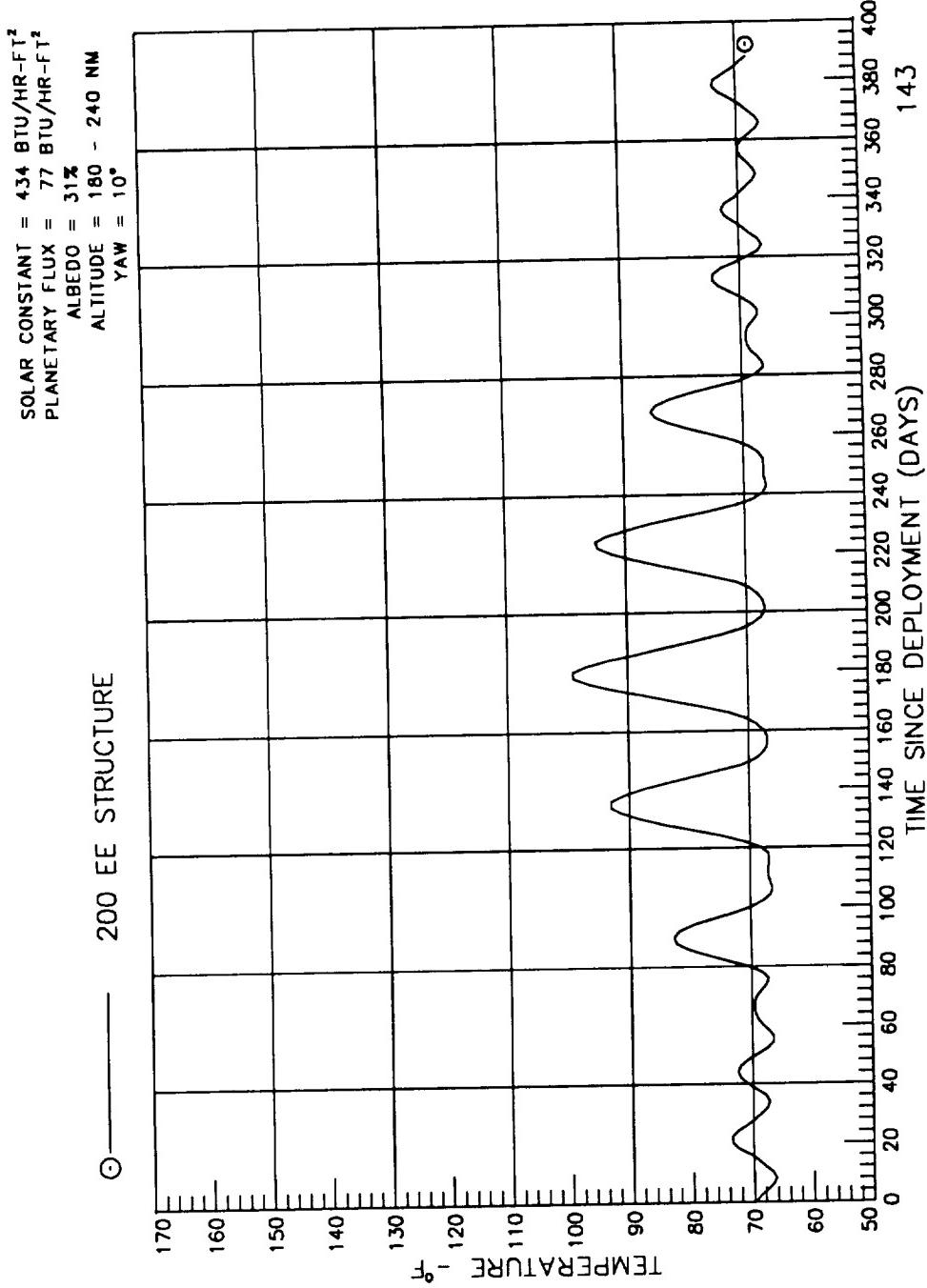
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H11



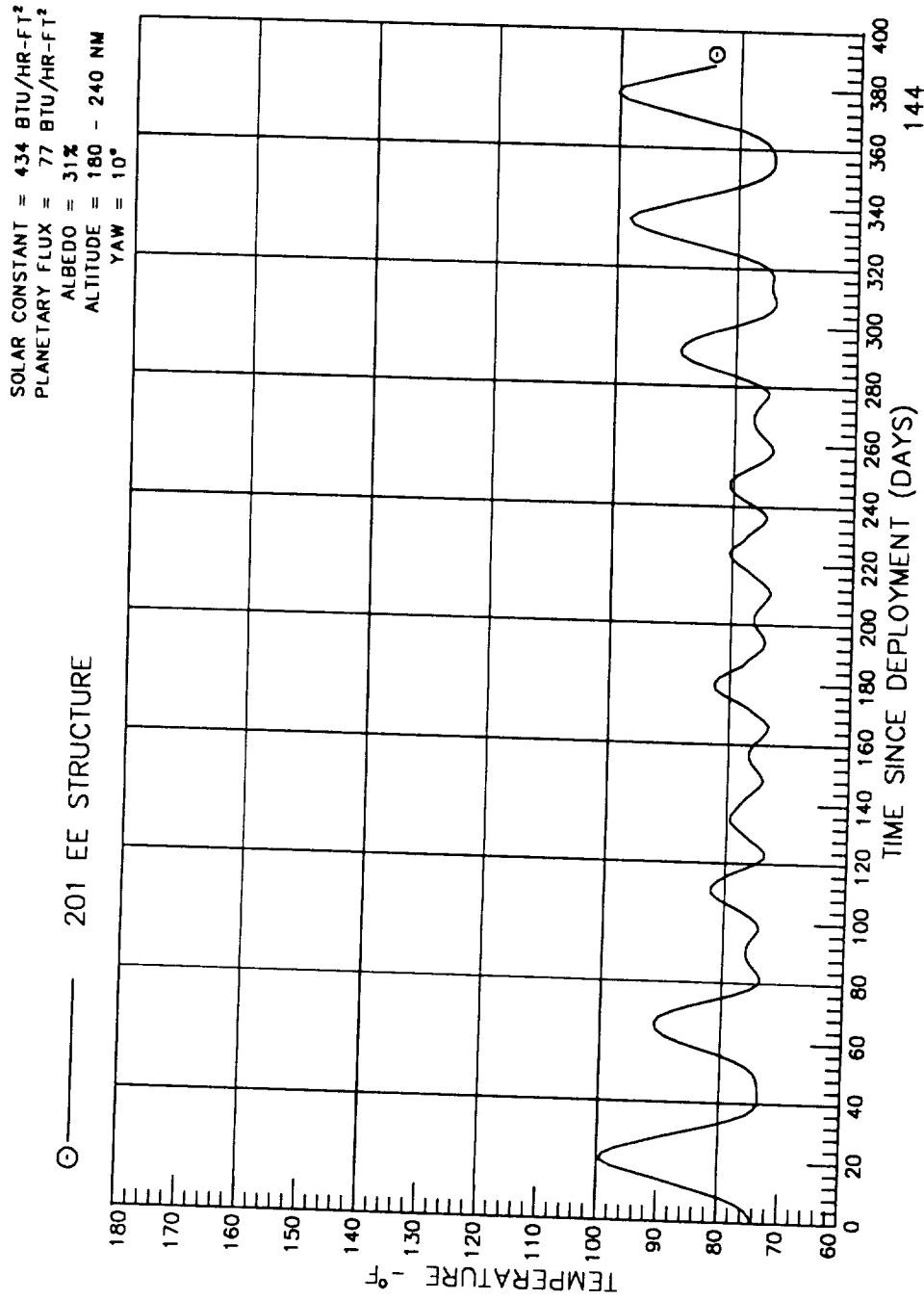
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC H12



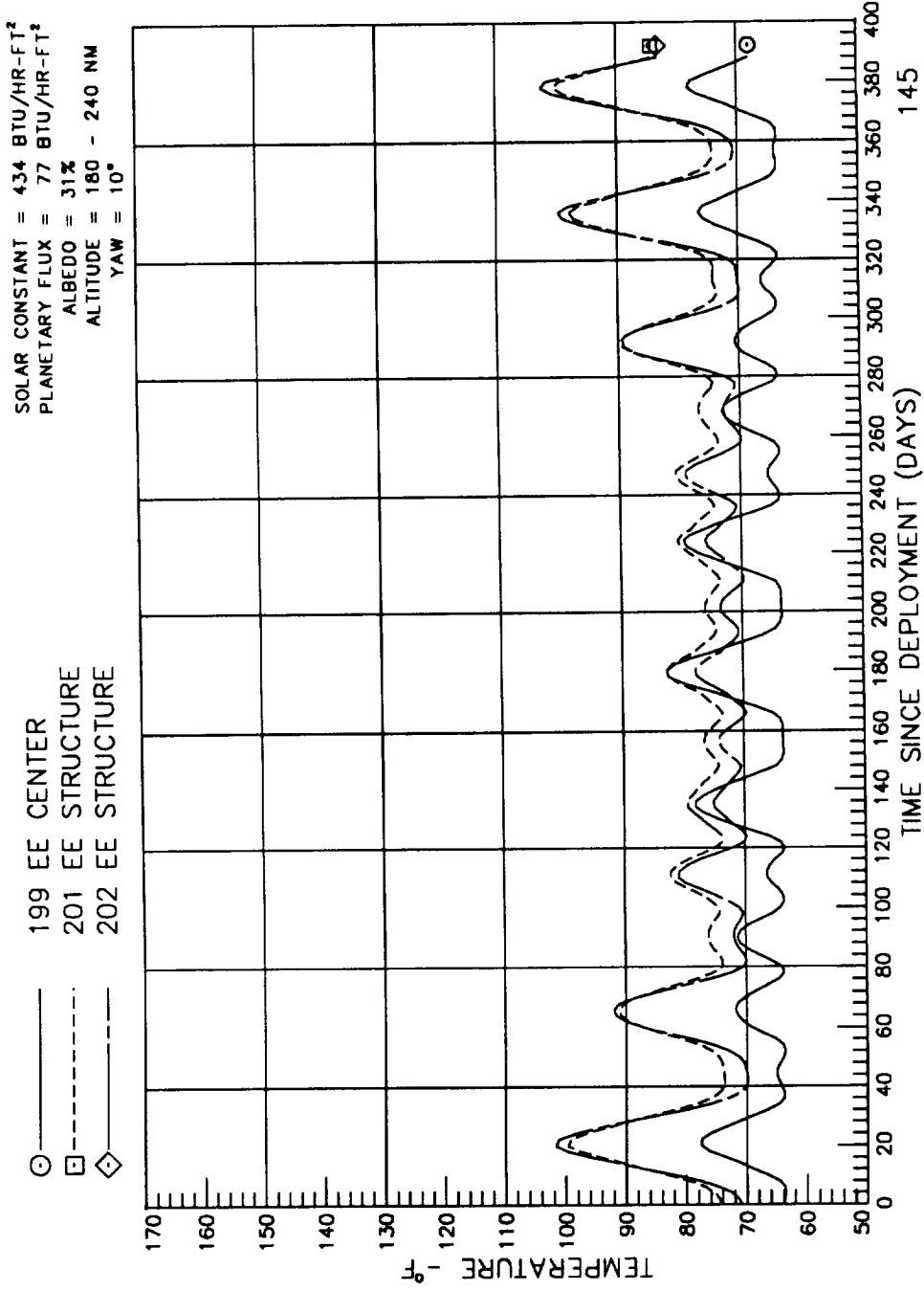
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC 62



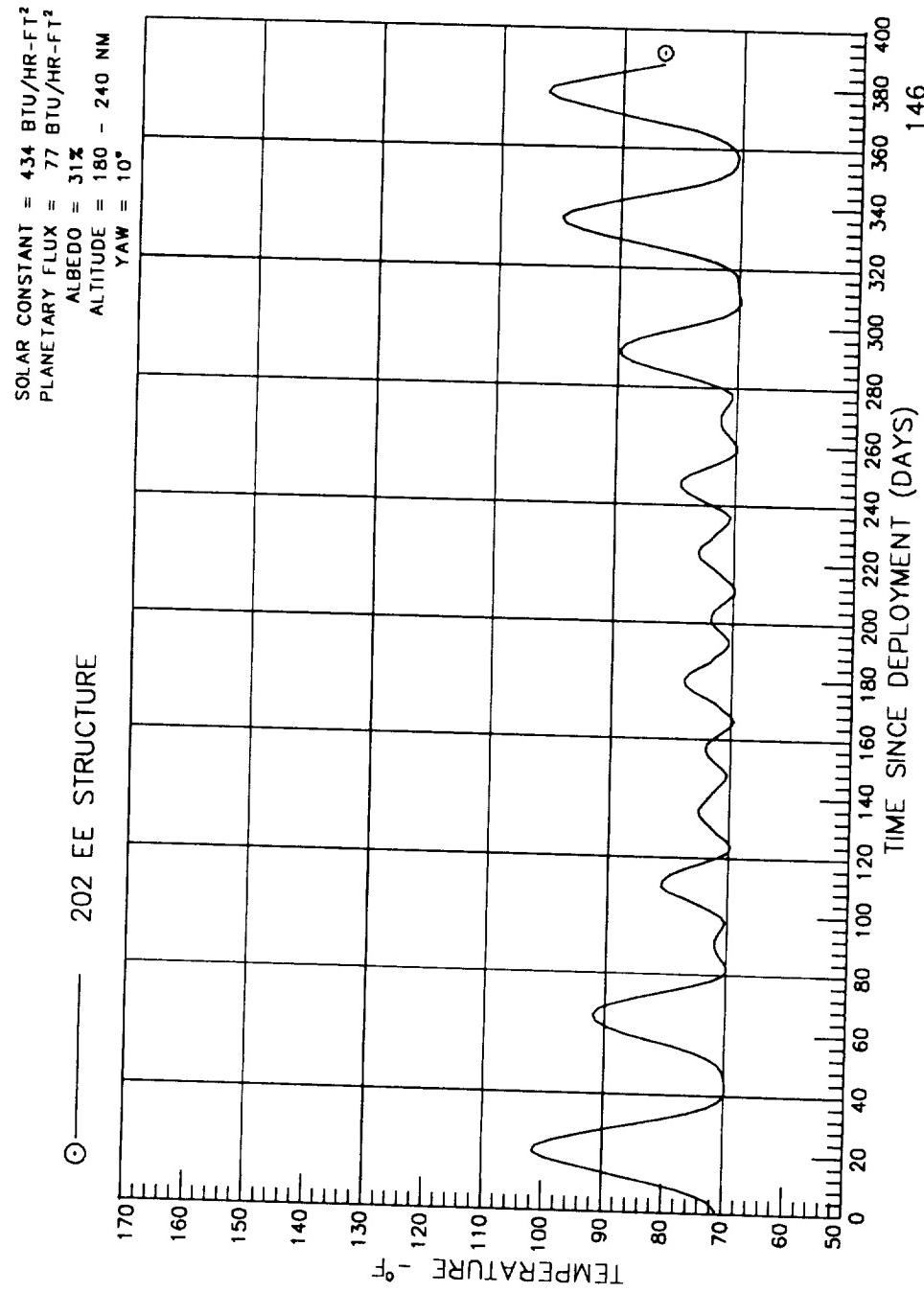
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC G4



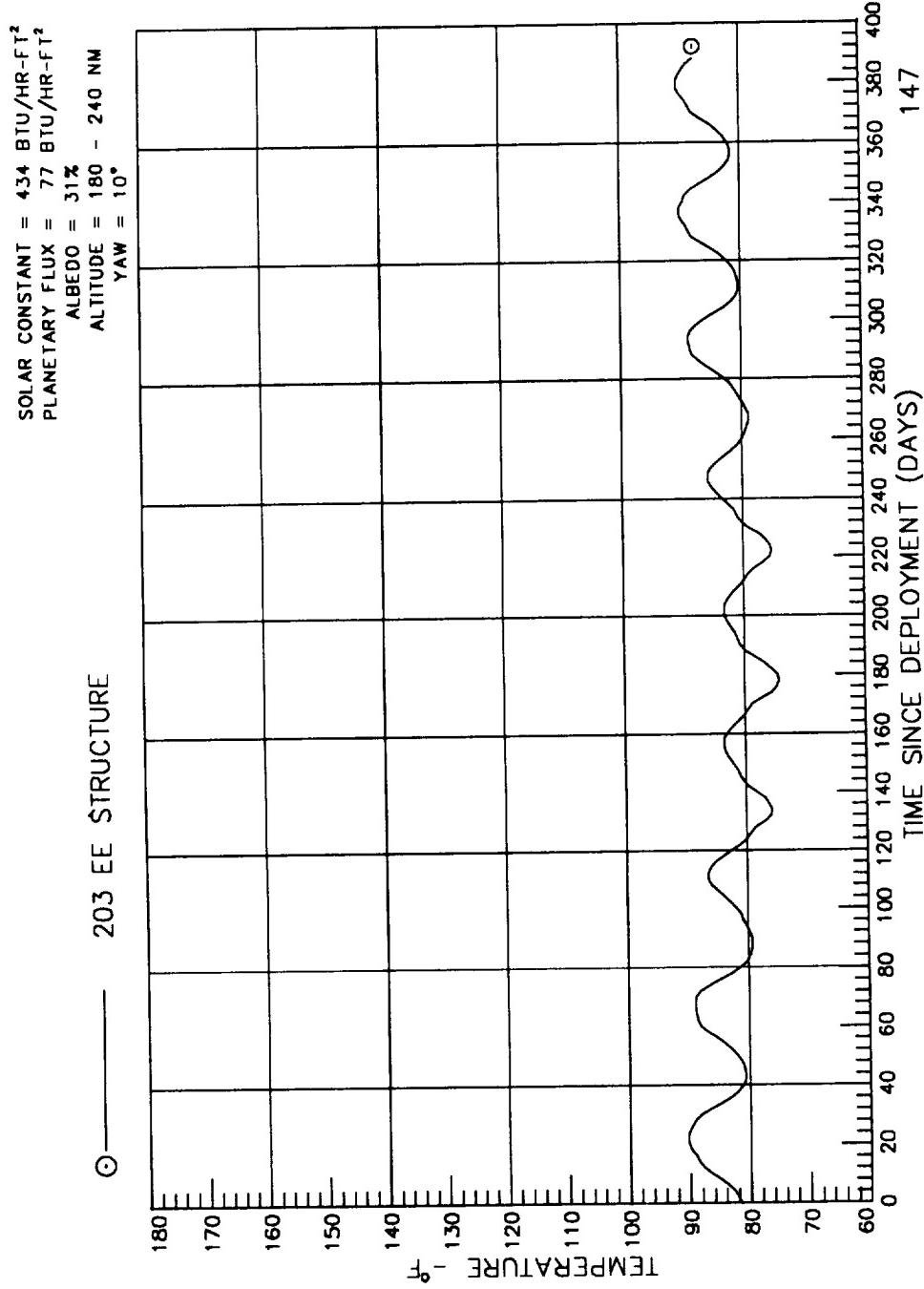
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE : LOC G6



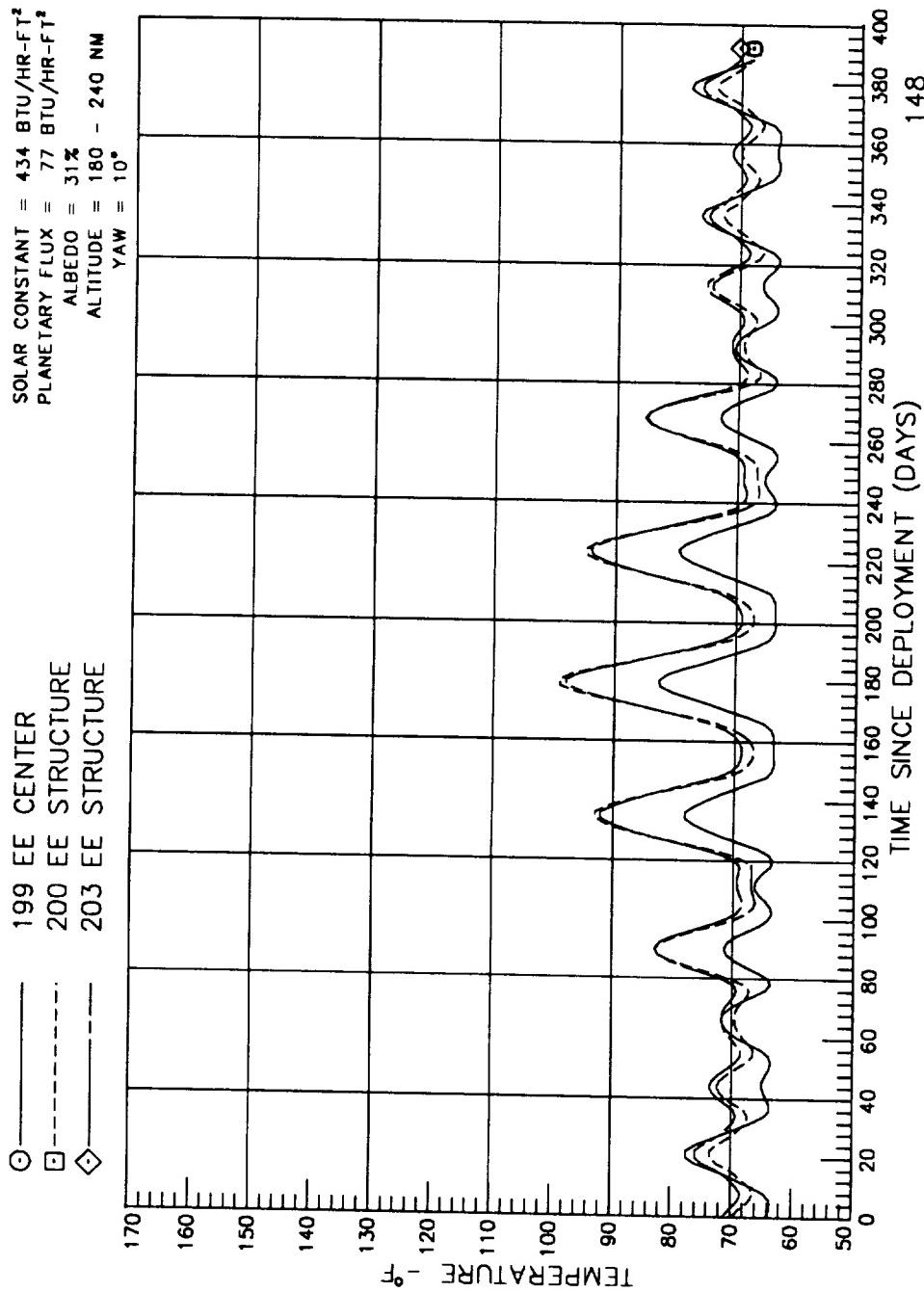
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC 68



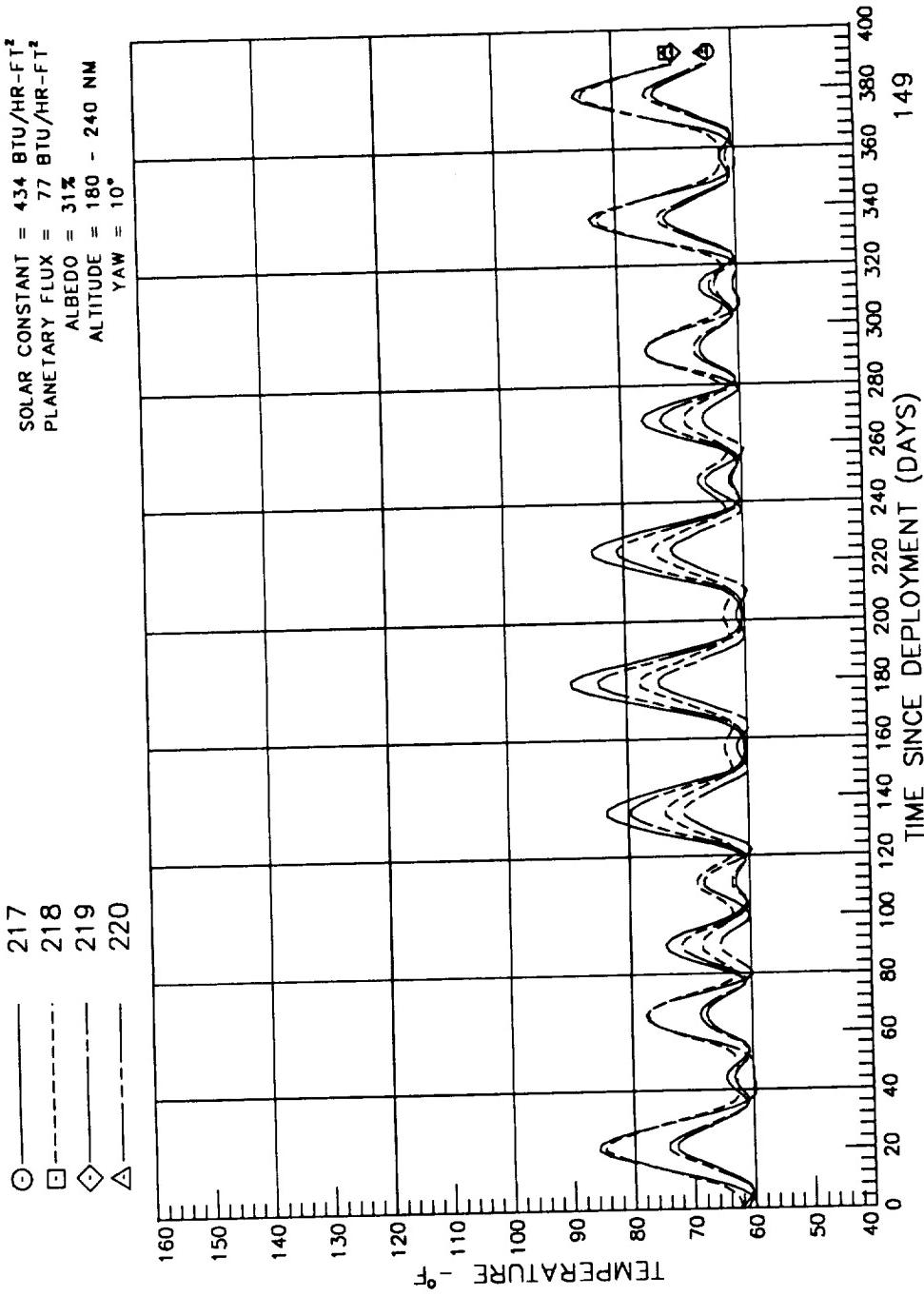
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC 610



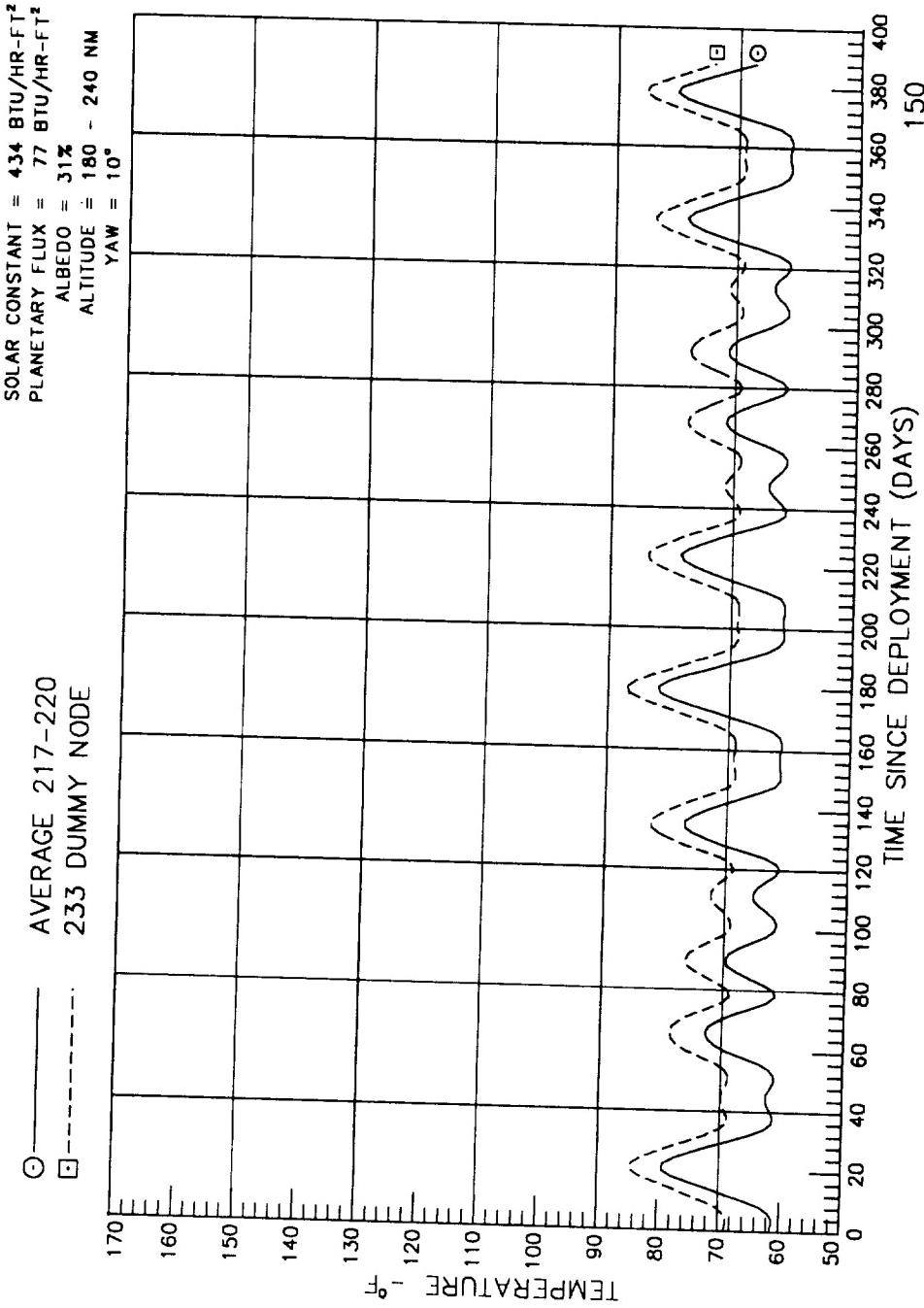
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 STRUCTURE: LOC G12



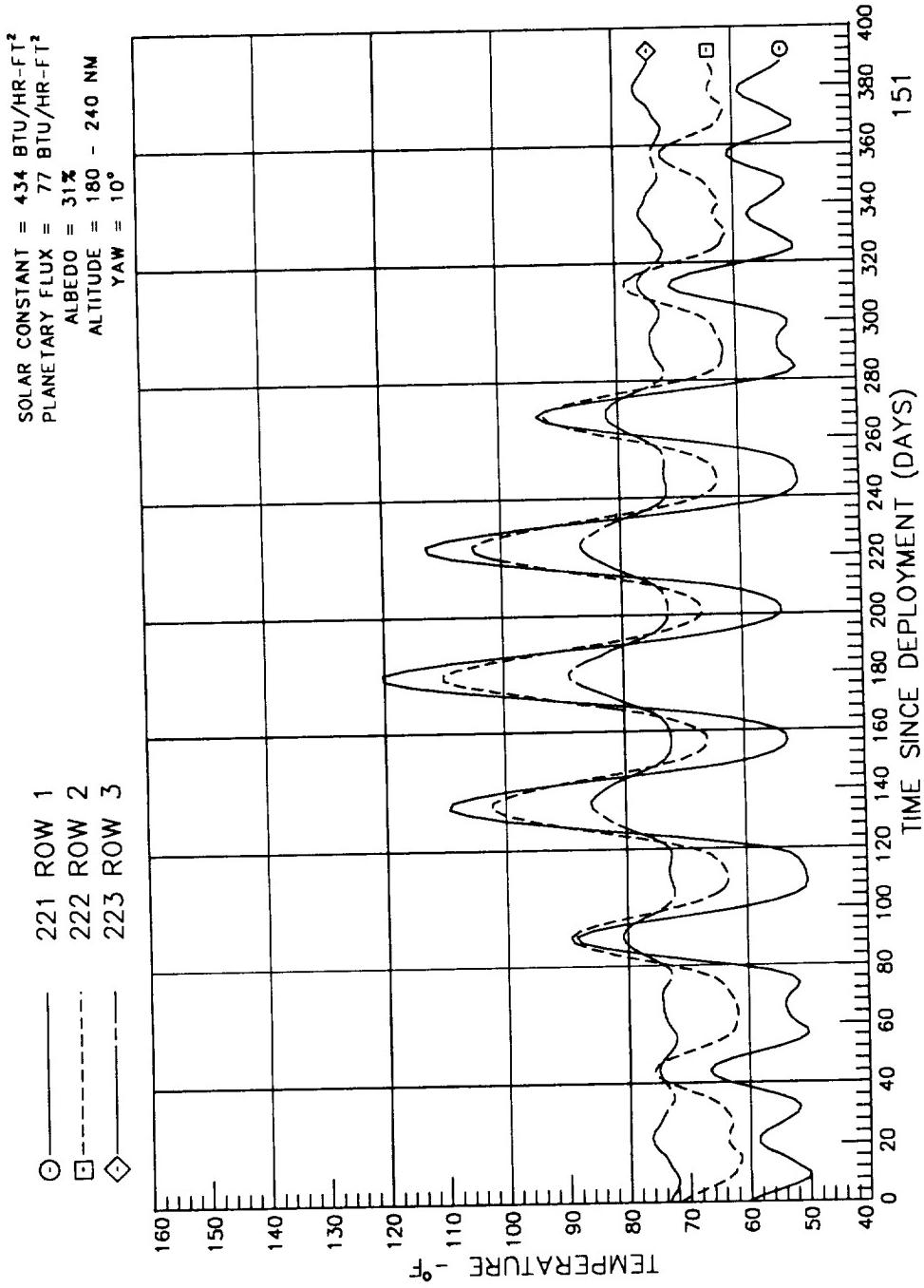
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER STRUCTURE INTERIOR



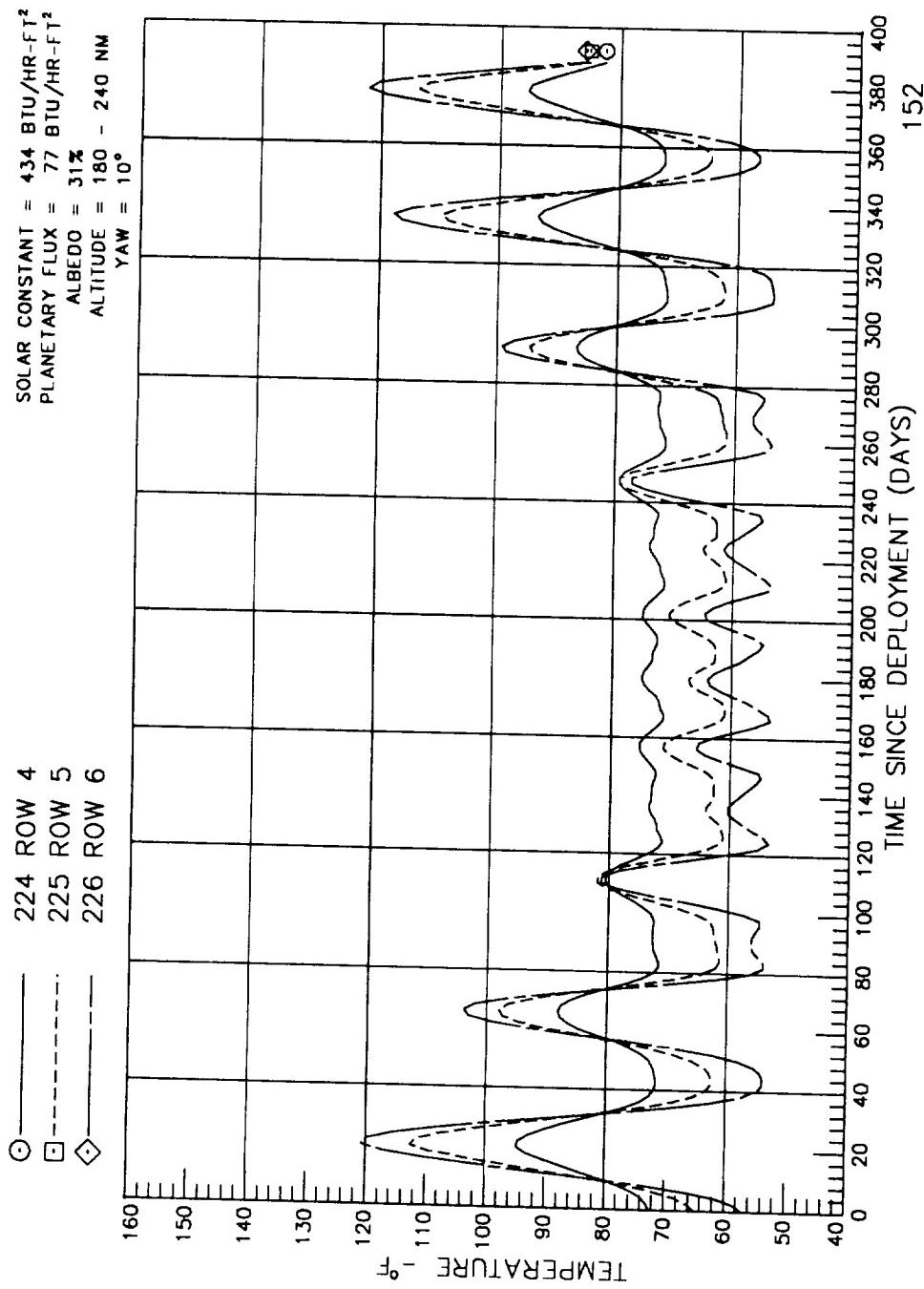
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER STRUCTURE



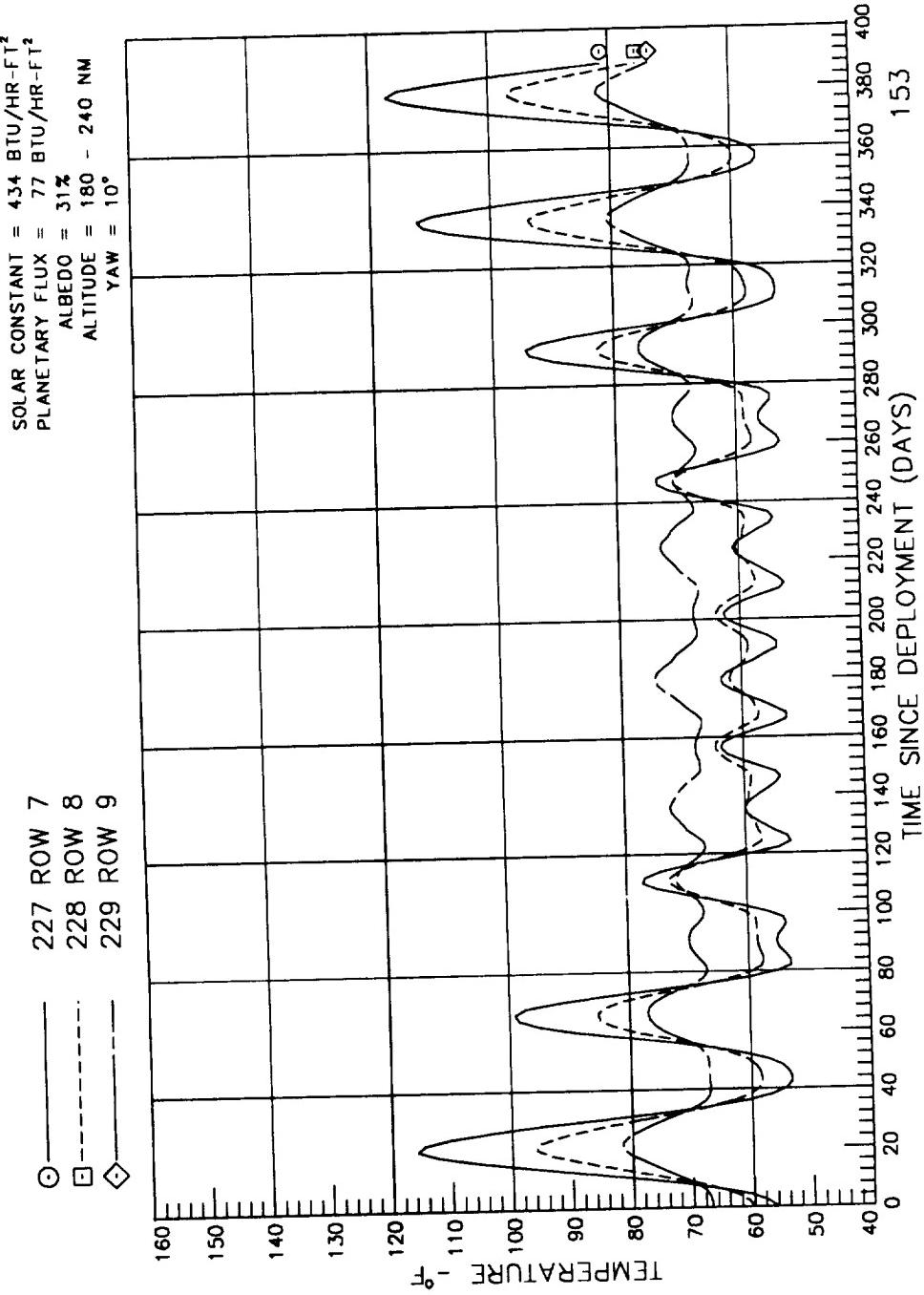
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER RING ROWS 1-3



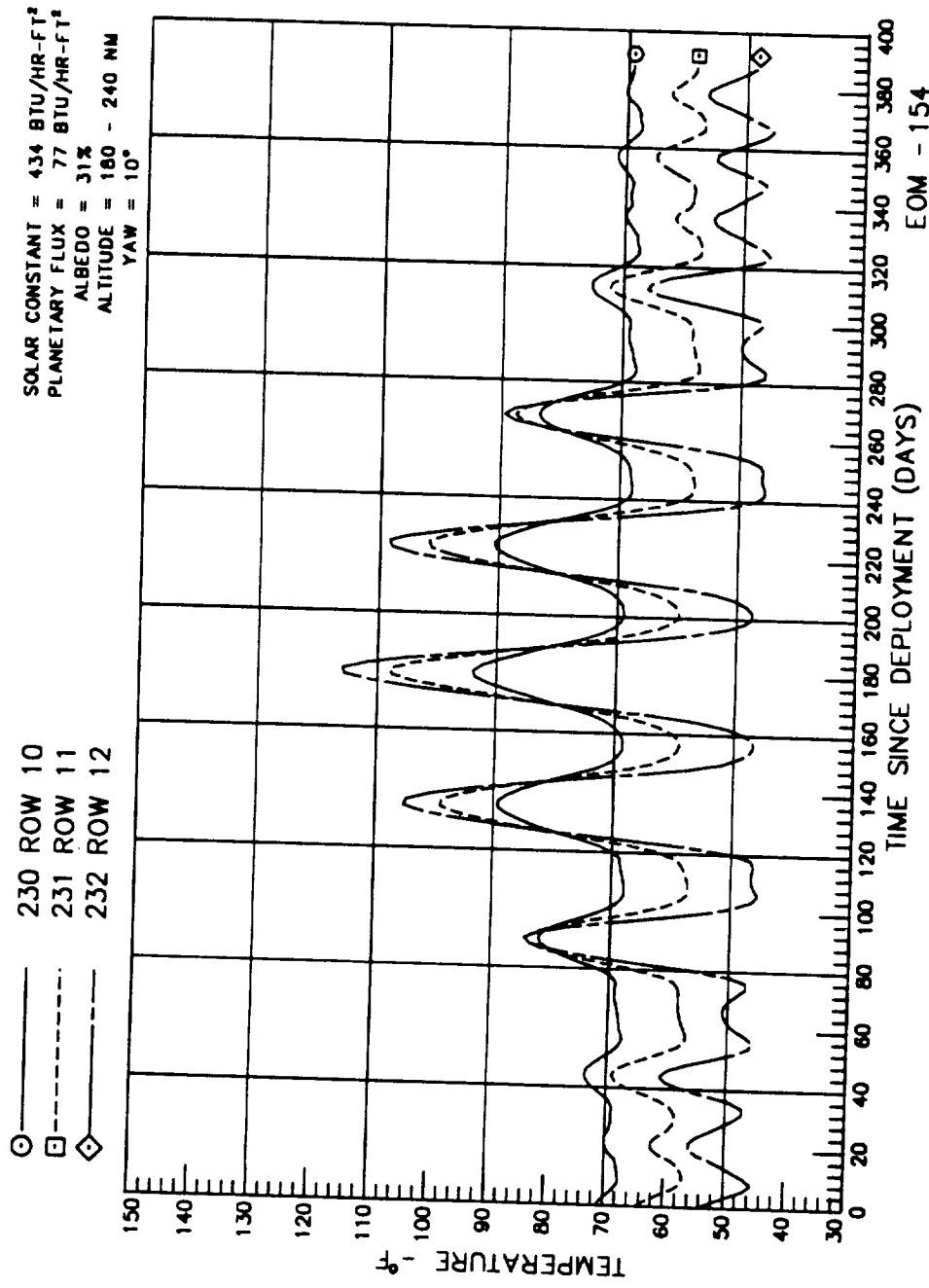
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER RING ROWS 4-6



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER RING ROWS 7-9



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 CENTER RING ROWS 10-12

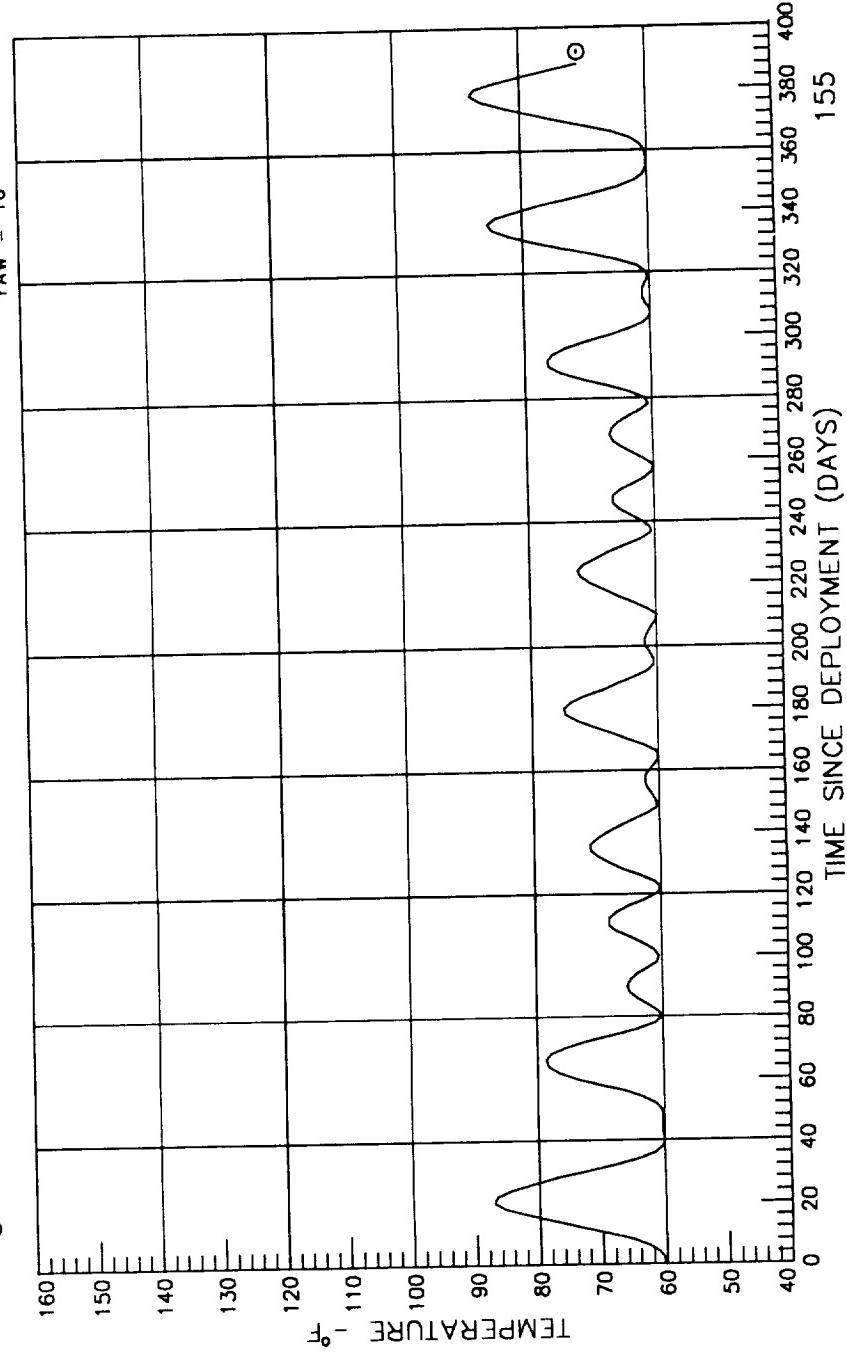


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 INITIATE SYSTEM

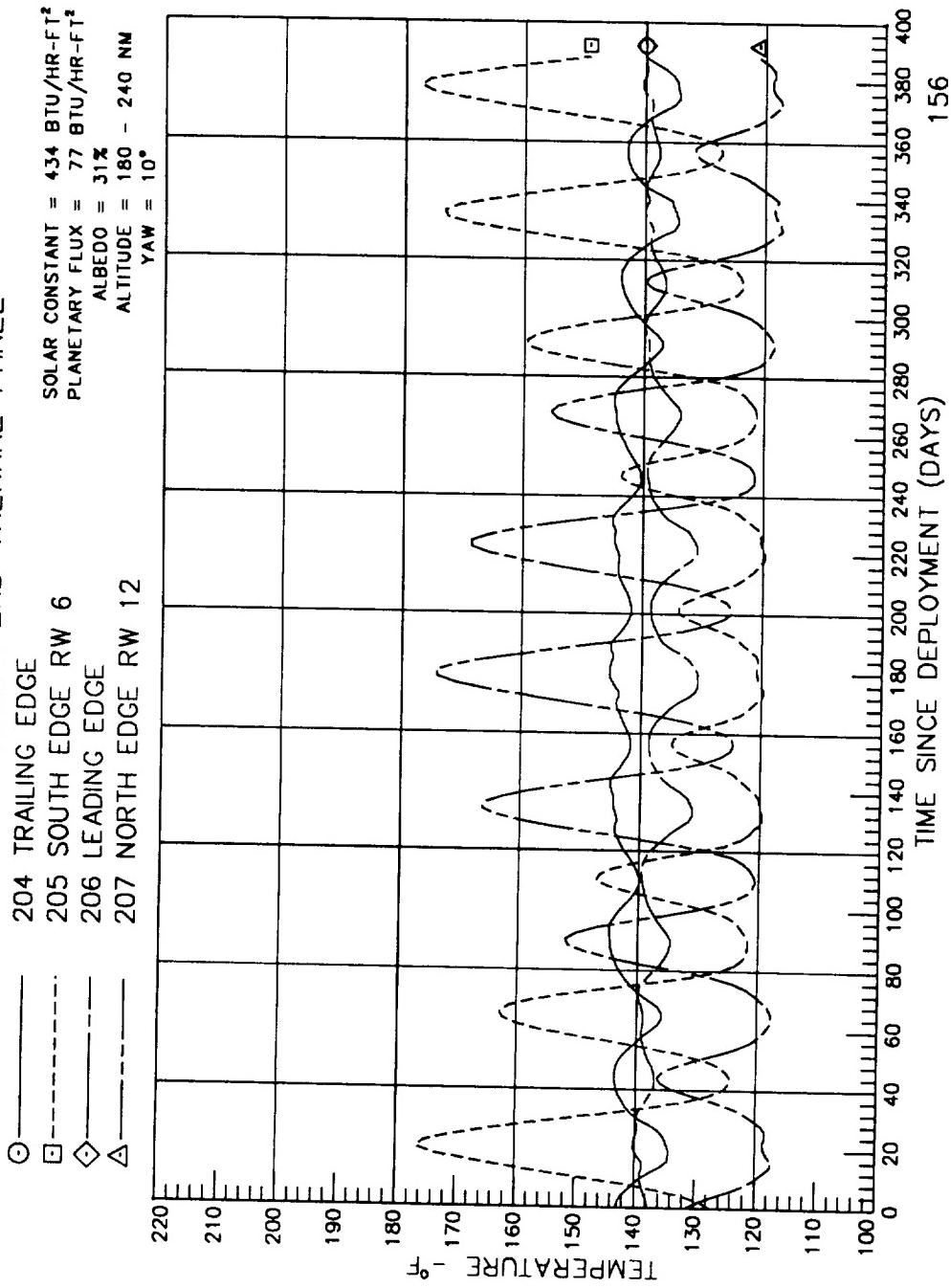
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

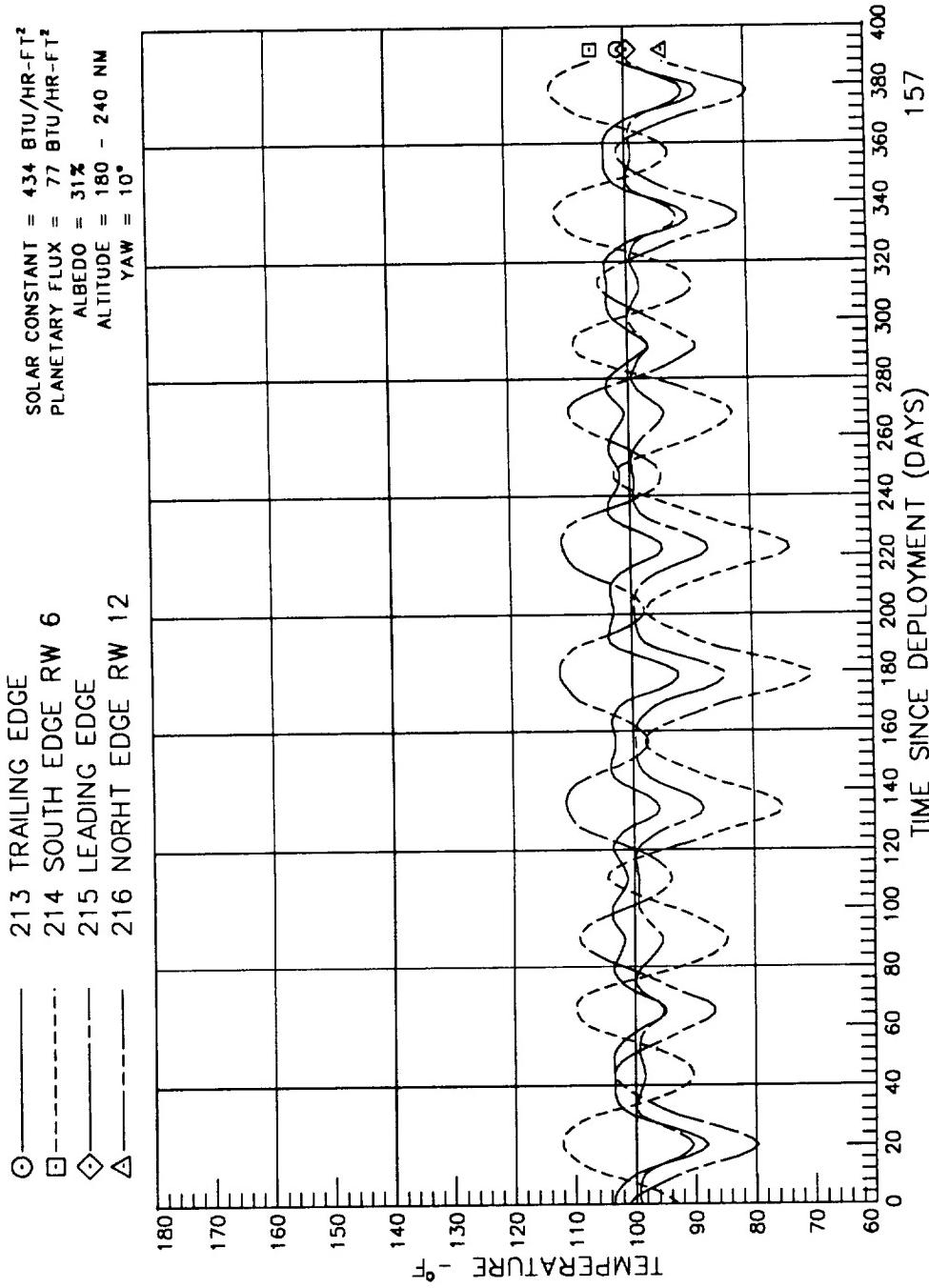
237 INITIATE SYSTEM



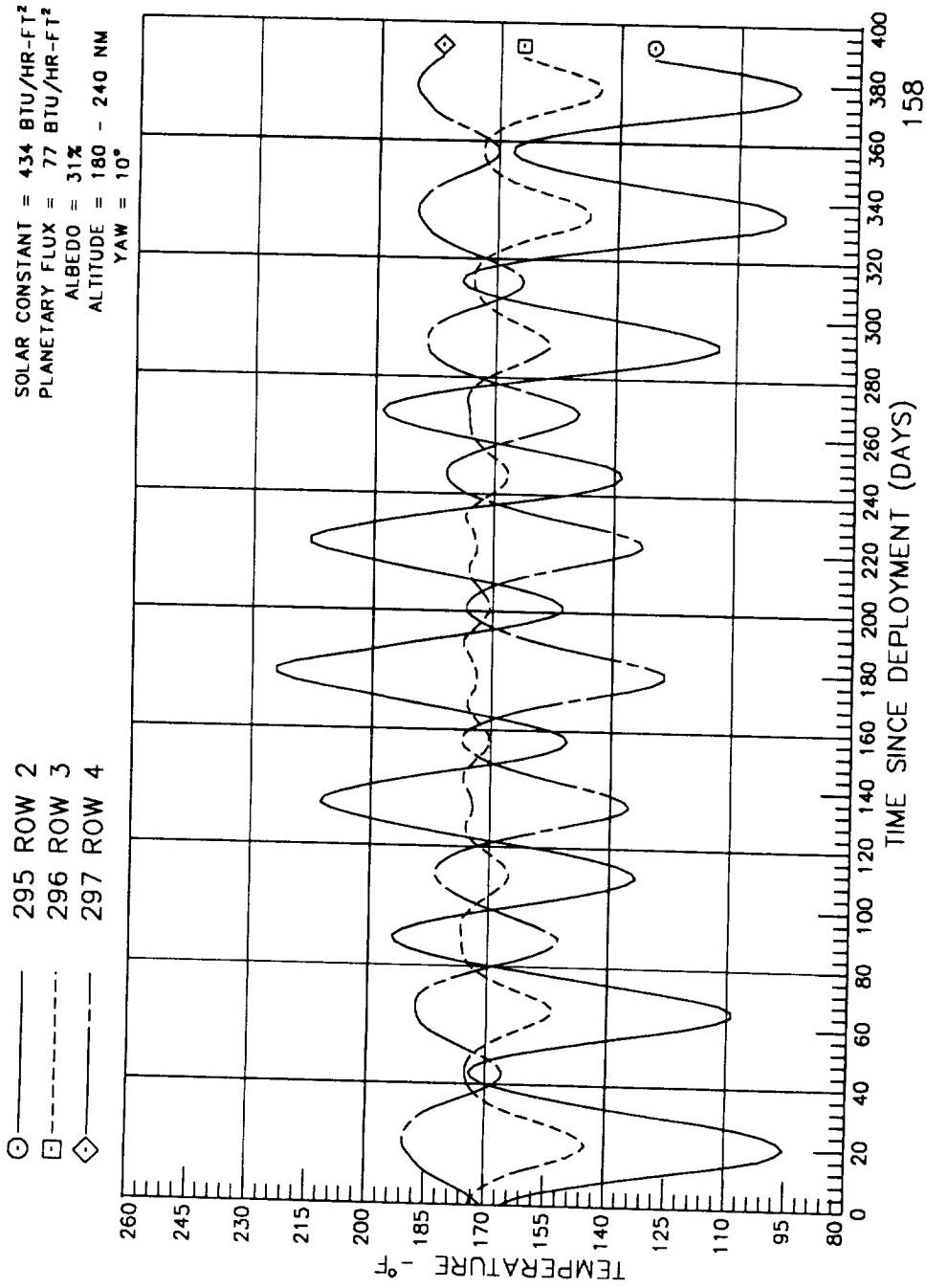
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 EARTH END THERMAL PANEL



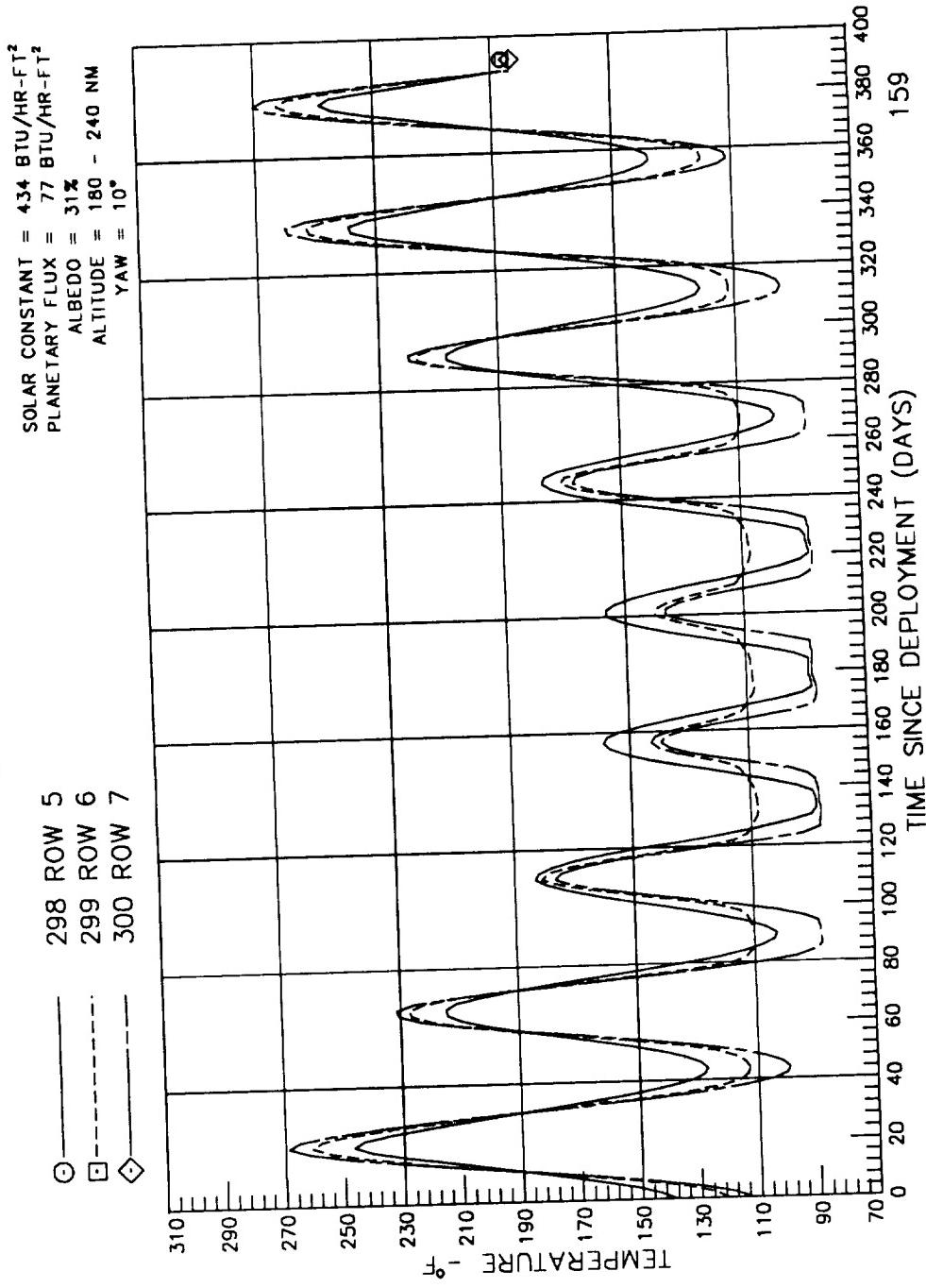
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 SPACE END THERMAL PANEL



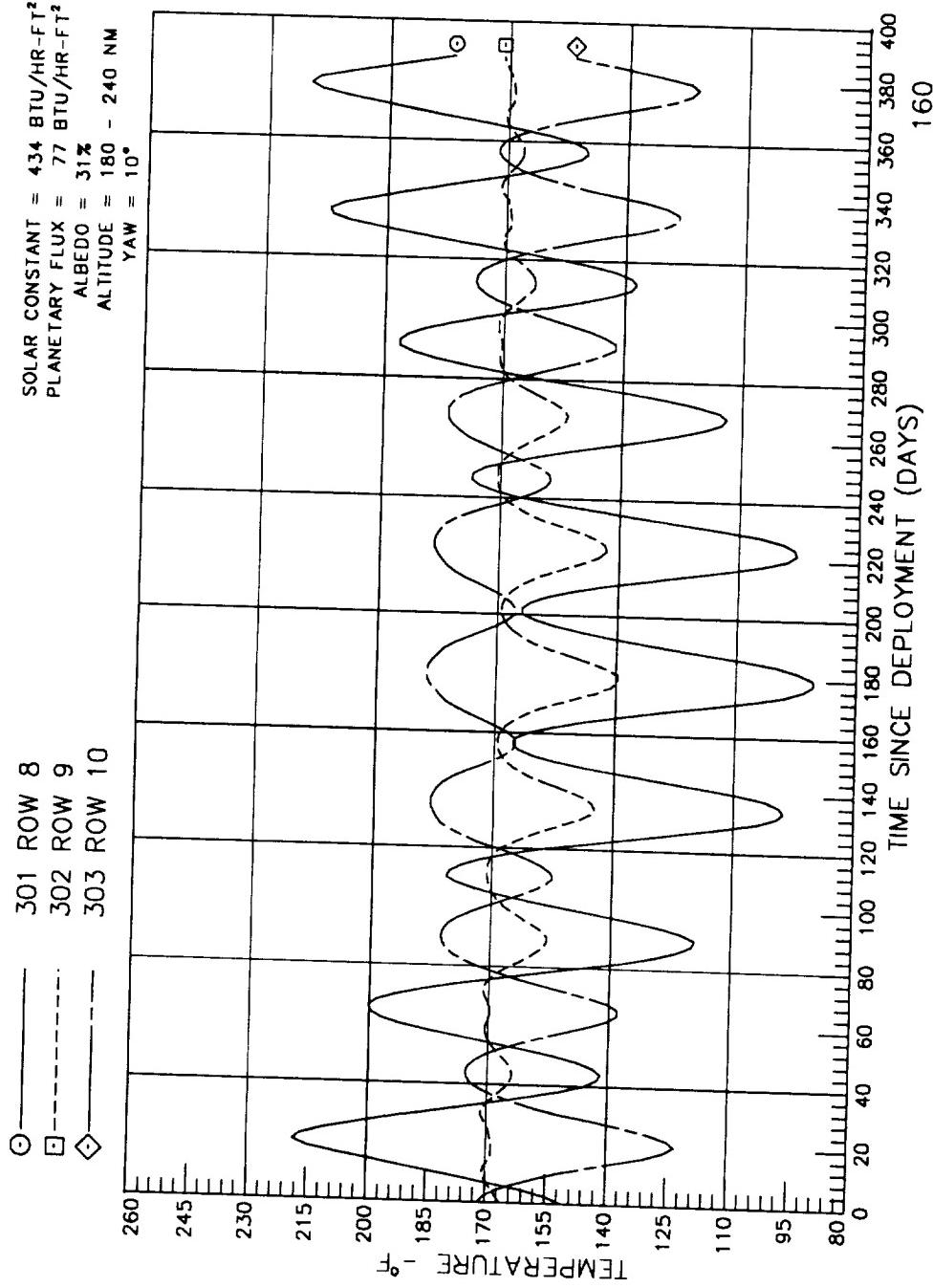
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 EARTH END THERMAL PANEL SIDE



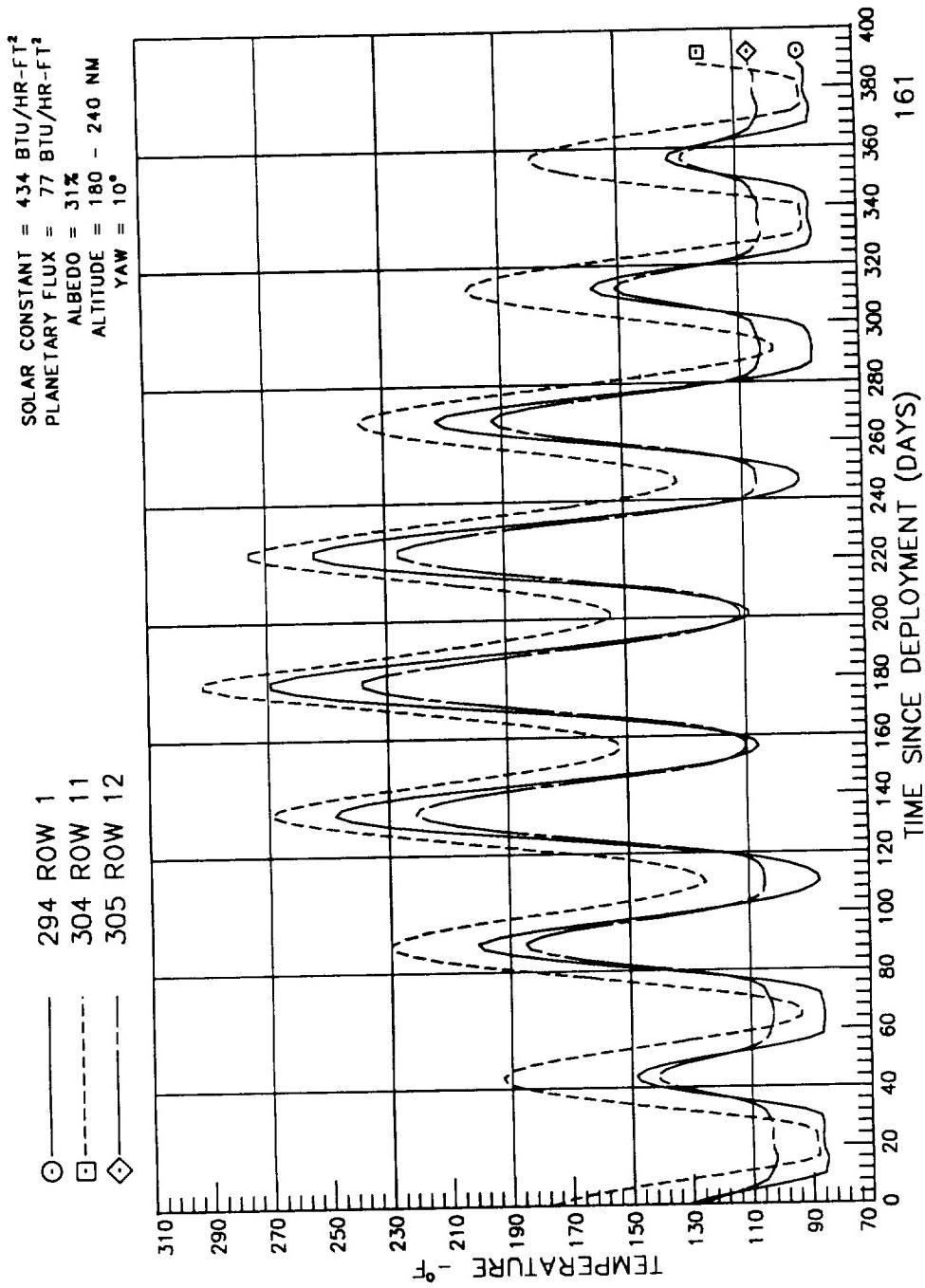
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 EARTH END THERMAL PANEL SIDE



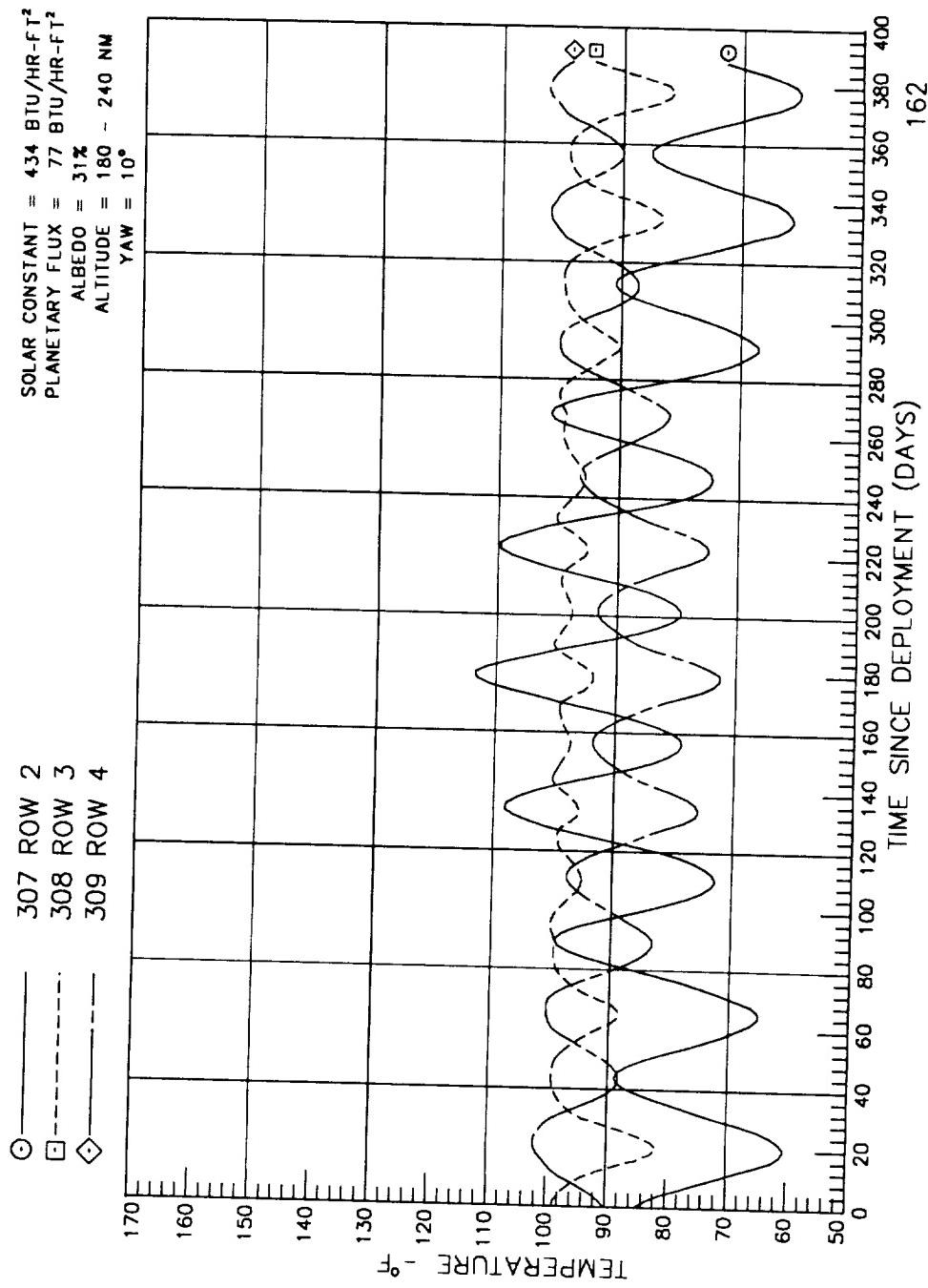
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
EARTH END THERMAL PANEL SIDE



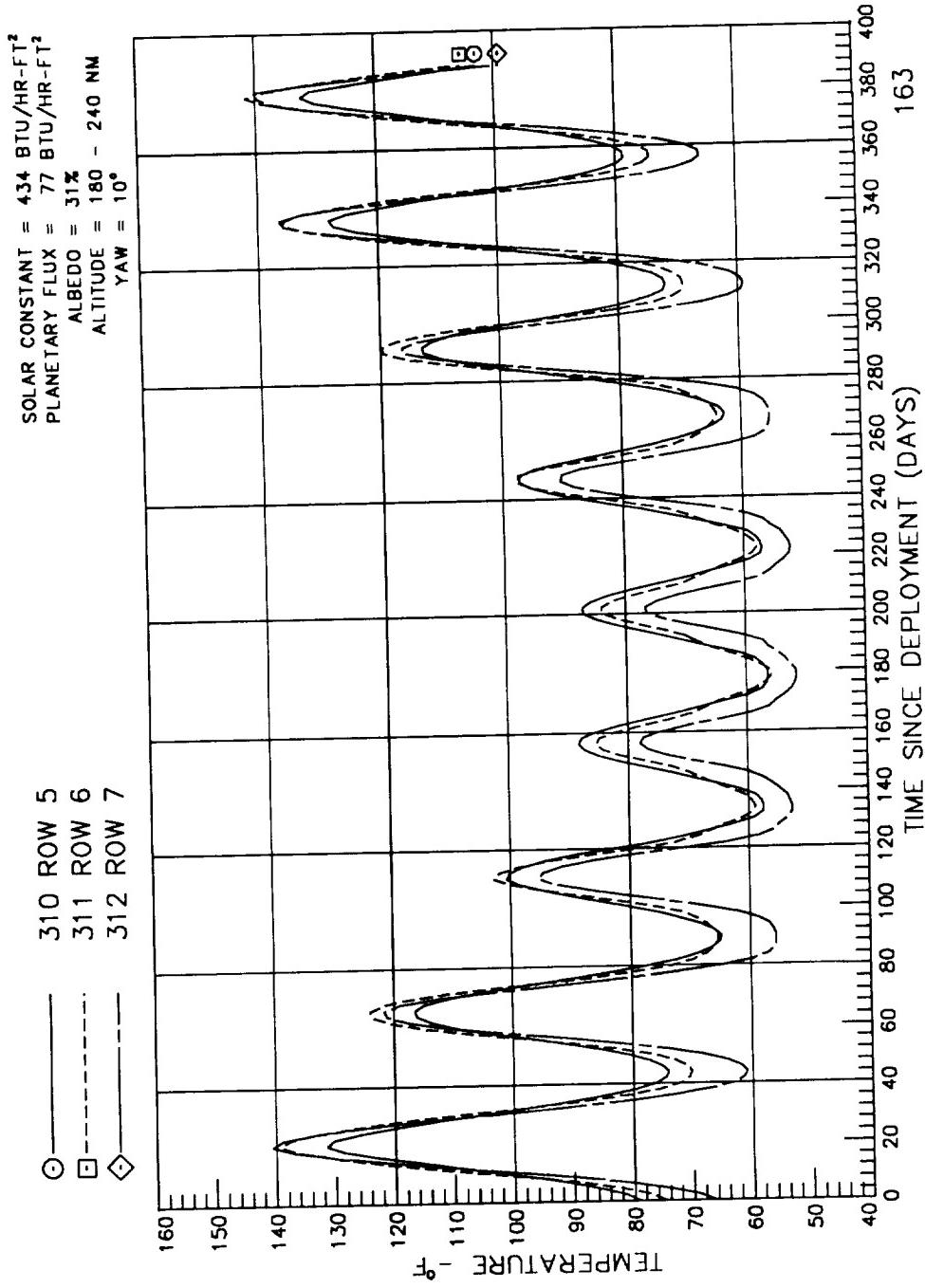
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 EARTH END THERMAL PANEL SIDE



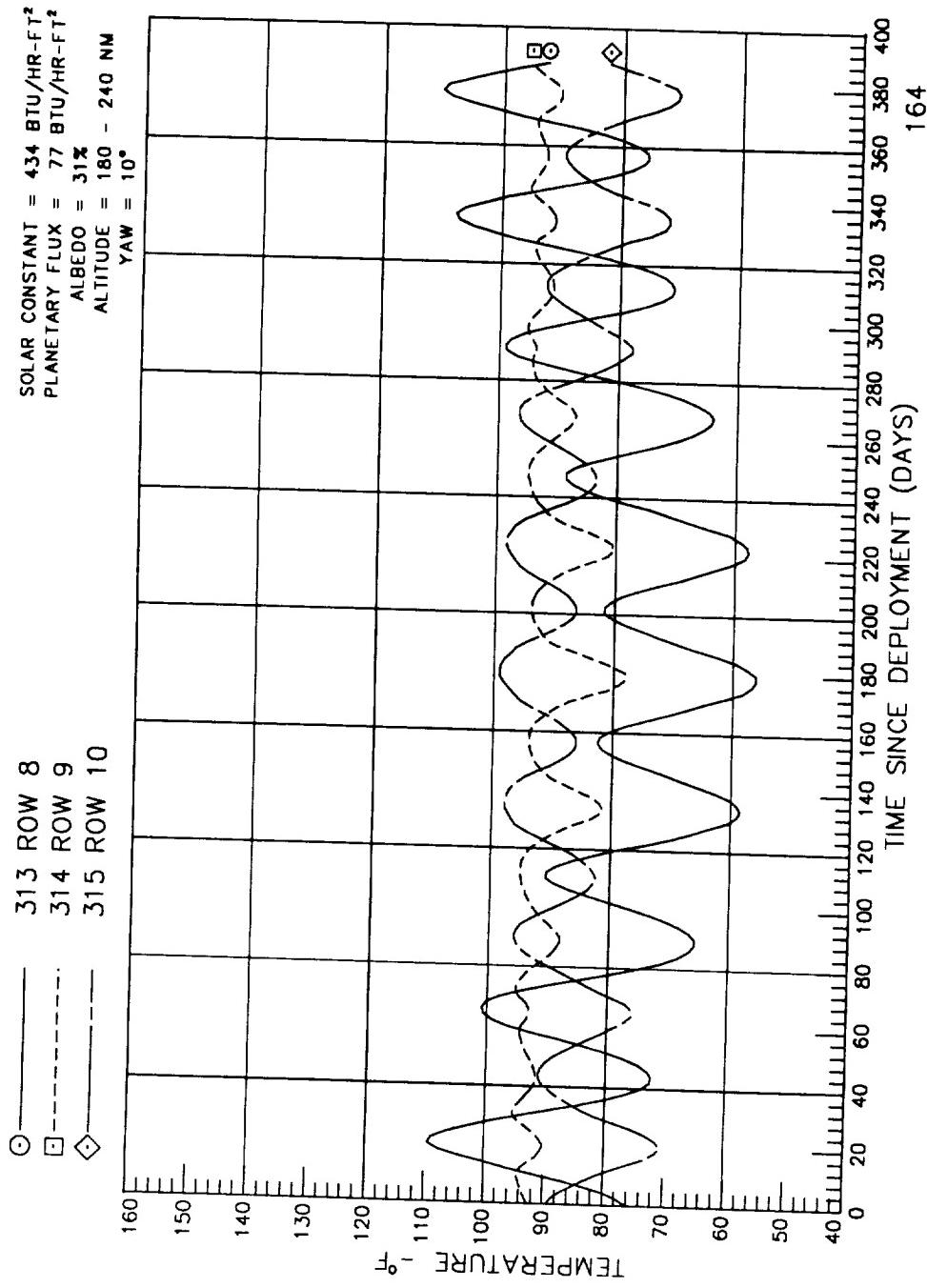
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 SPACE END THERMAL PANEL SIDE



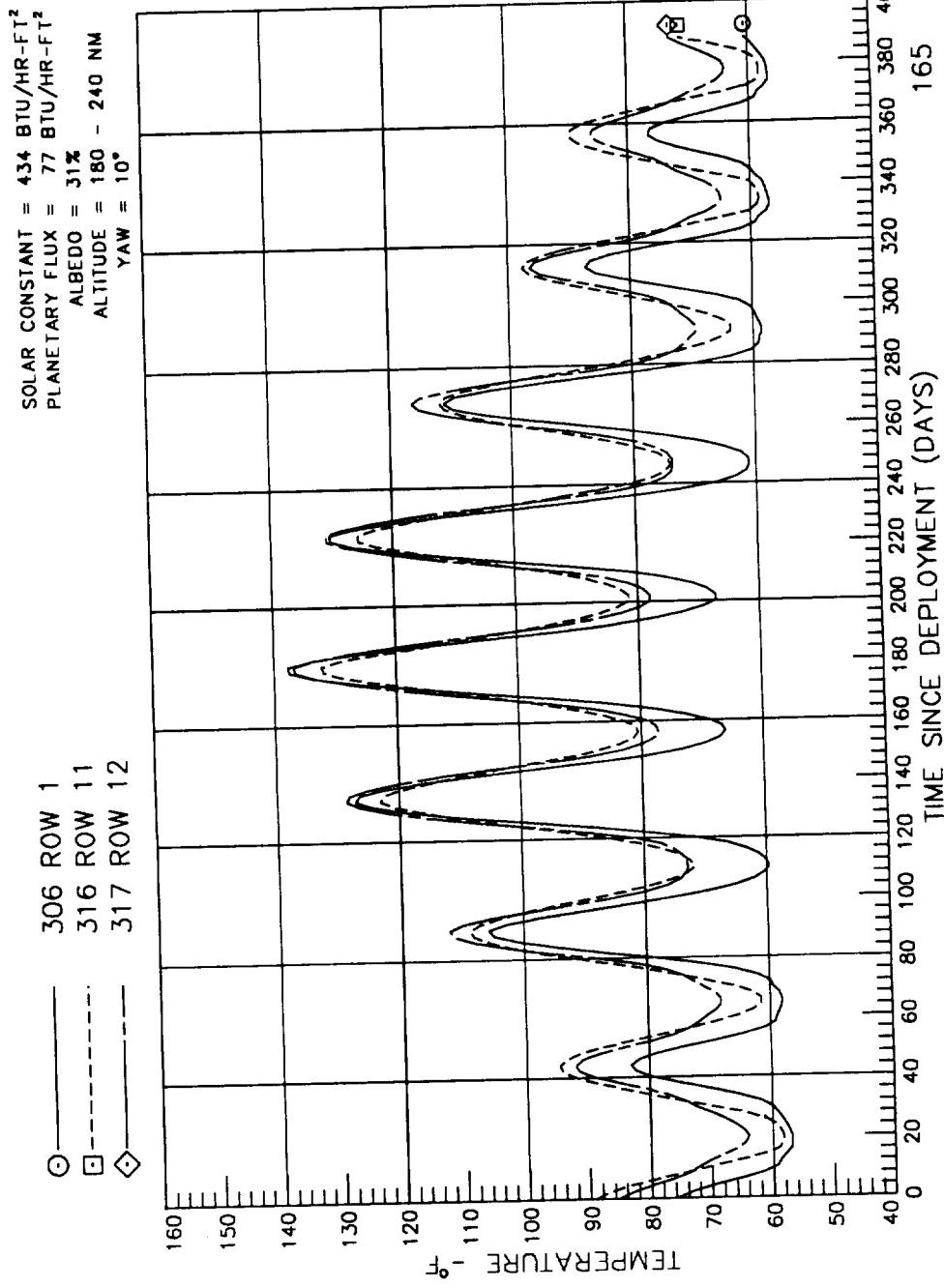
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 SPACE END THERMAL PANEL SIDE



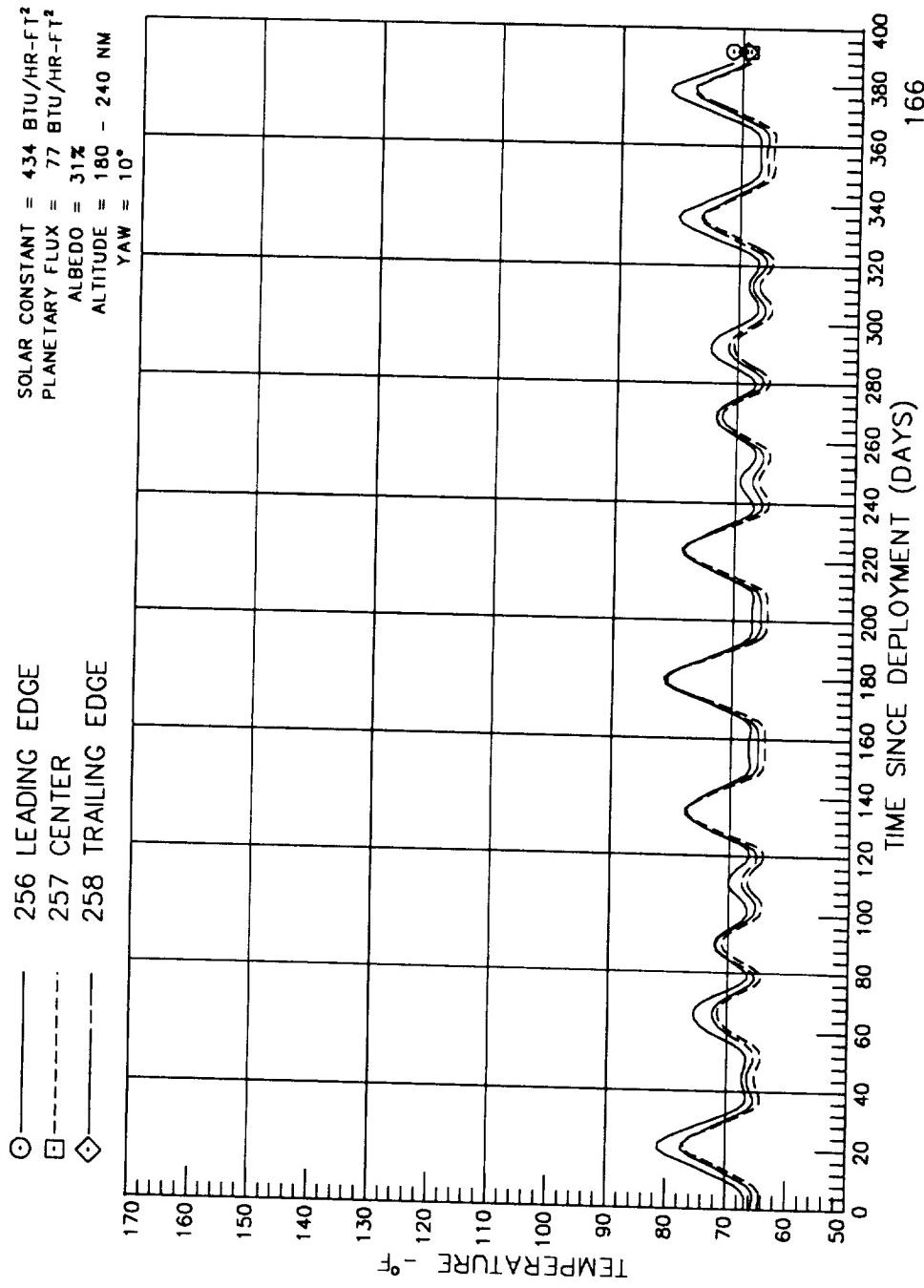
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 SPACE END THERMAL PANEL SIDE



LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
SPACE END THERMAL PANEL SIDE



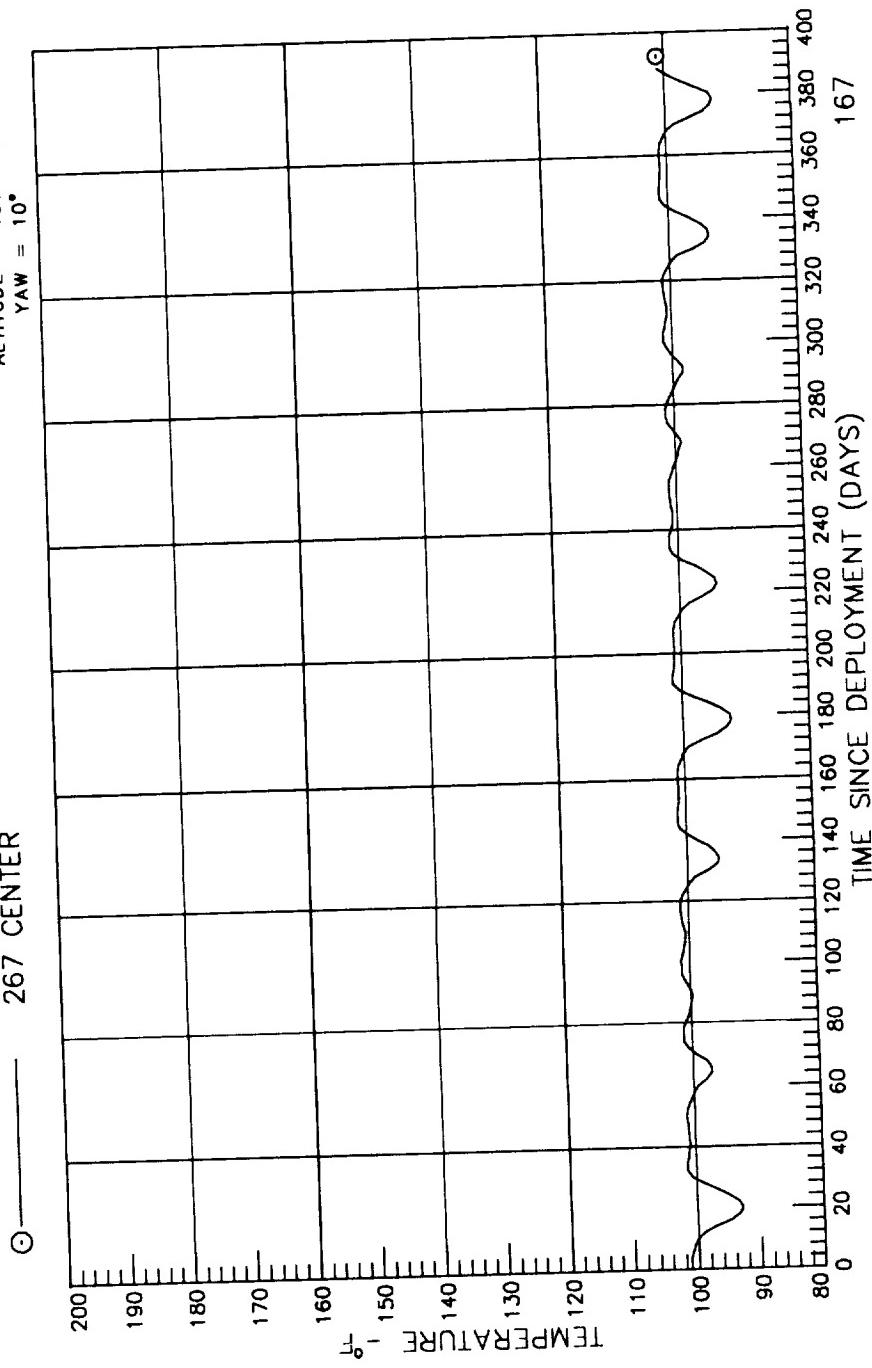
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 EARTH DUMMY COVER PLATES



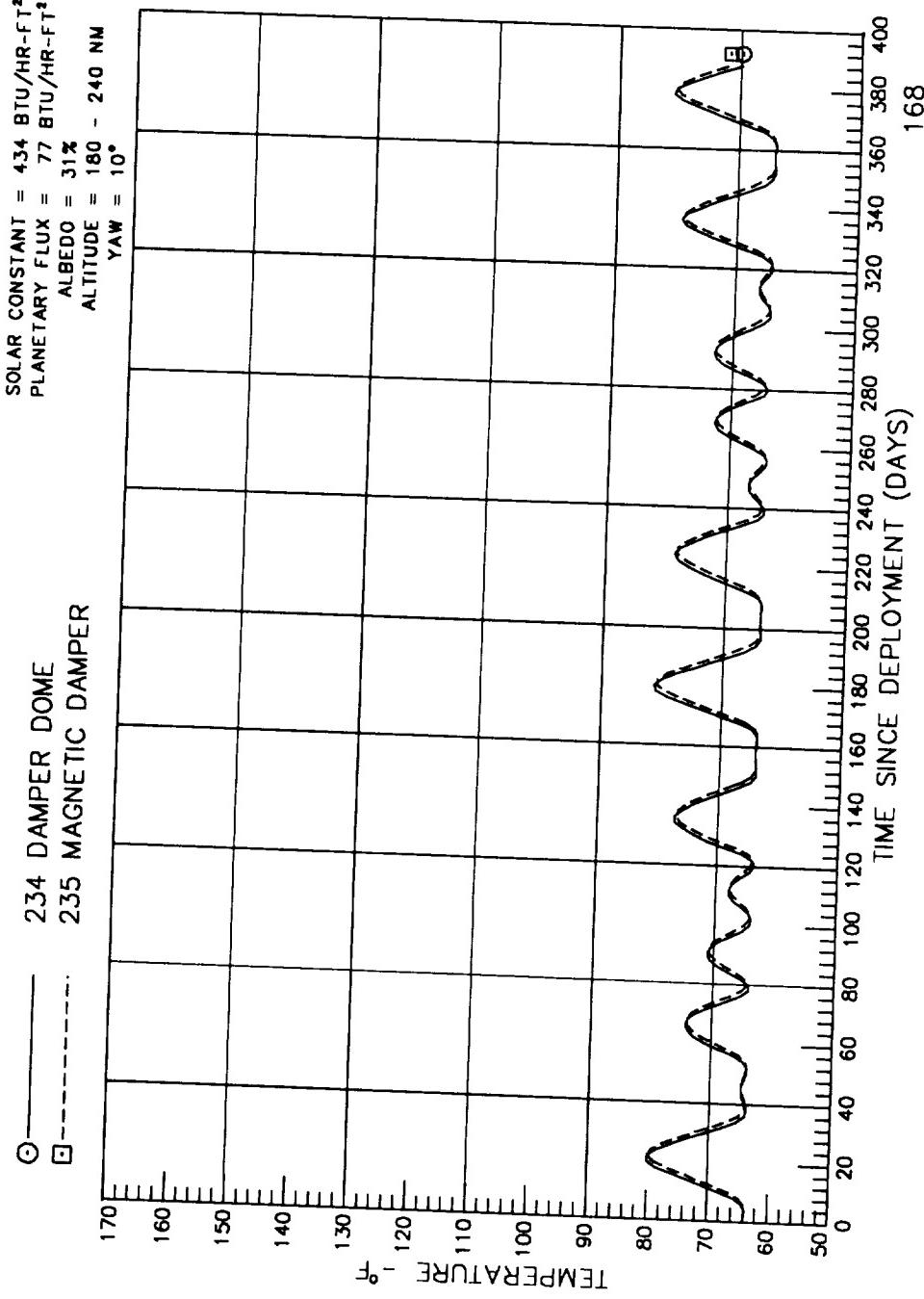
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 SPACE DUMMY COVER PLATE CENTER

SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 MAGNETIC DAMPER & SHROUD

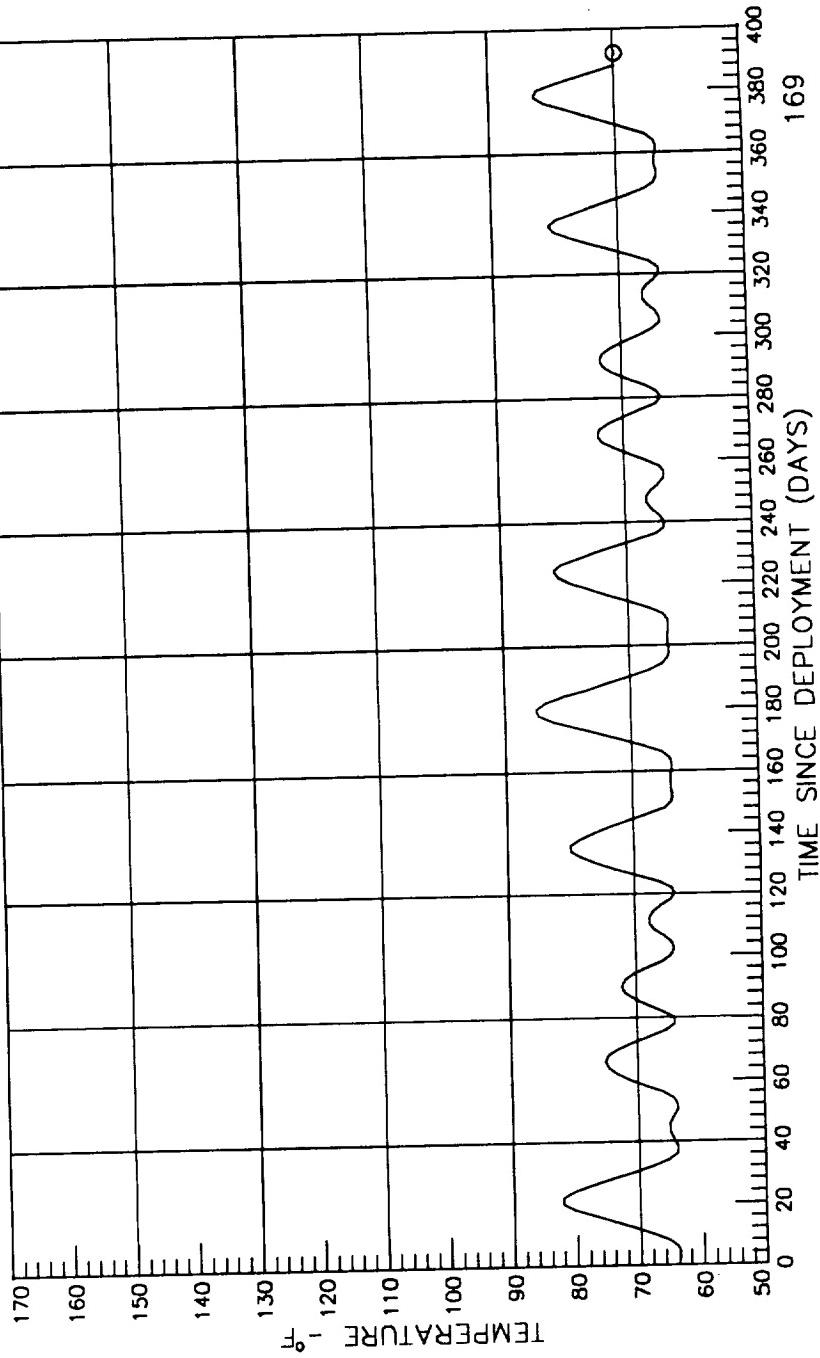


LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 BATTERIES FOR A0139-A

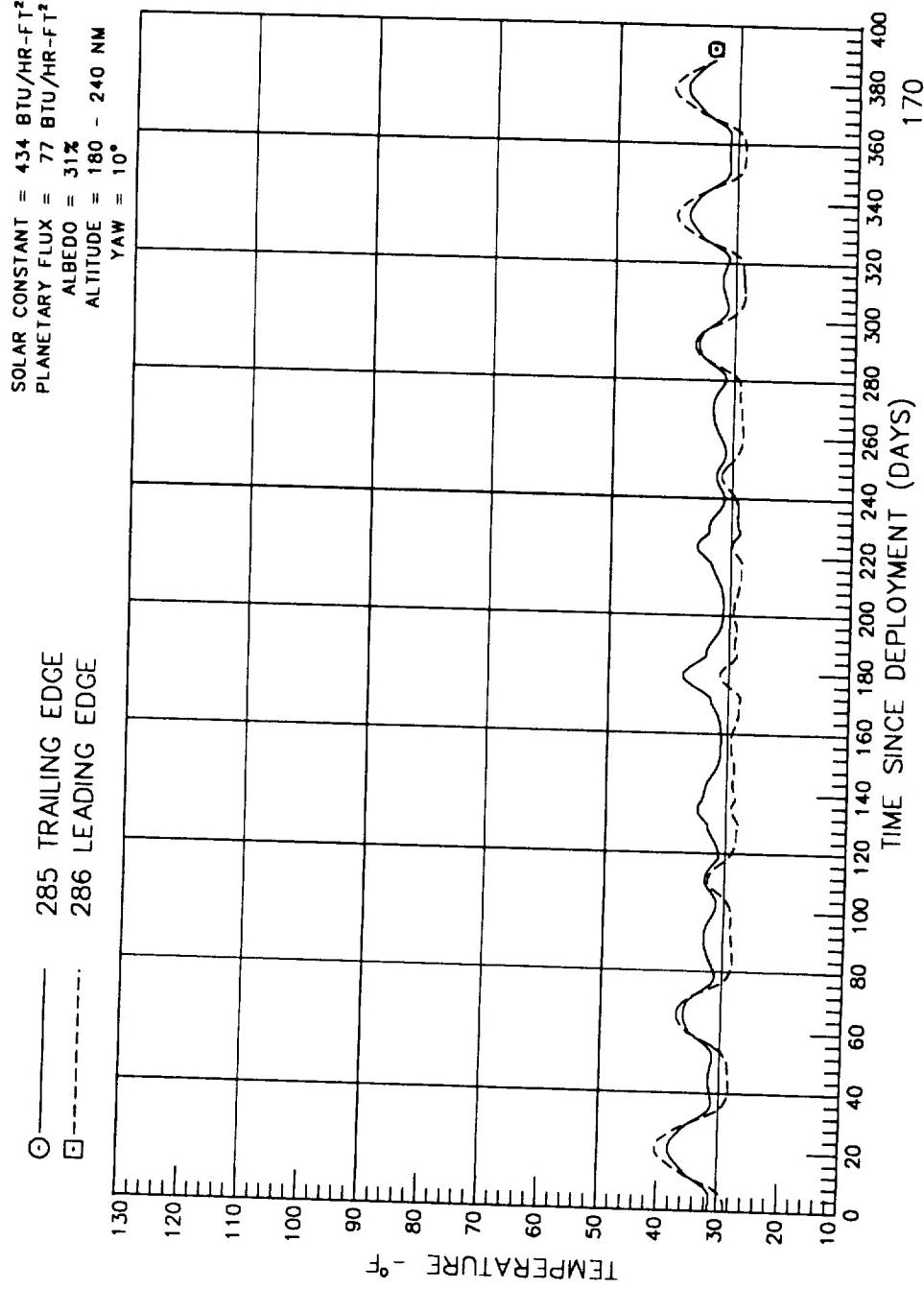
SOLAR CONSTANT = 434 BTU/HR-F²
 PLANETARY FLUX = 77 BTU/HR-F²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

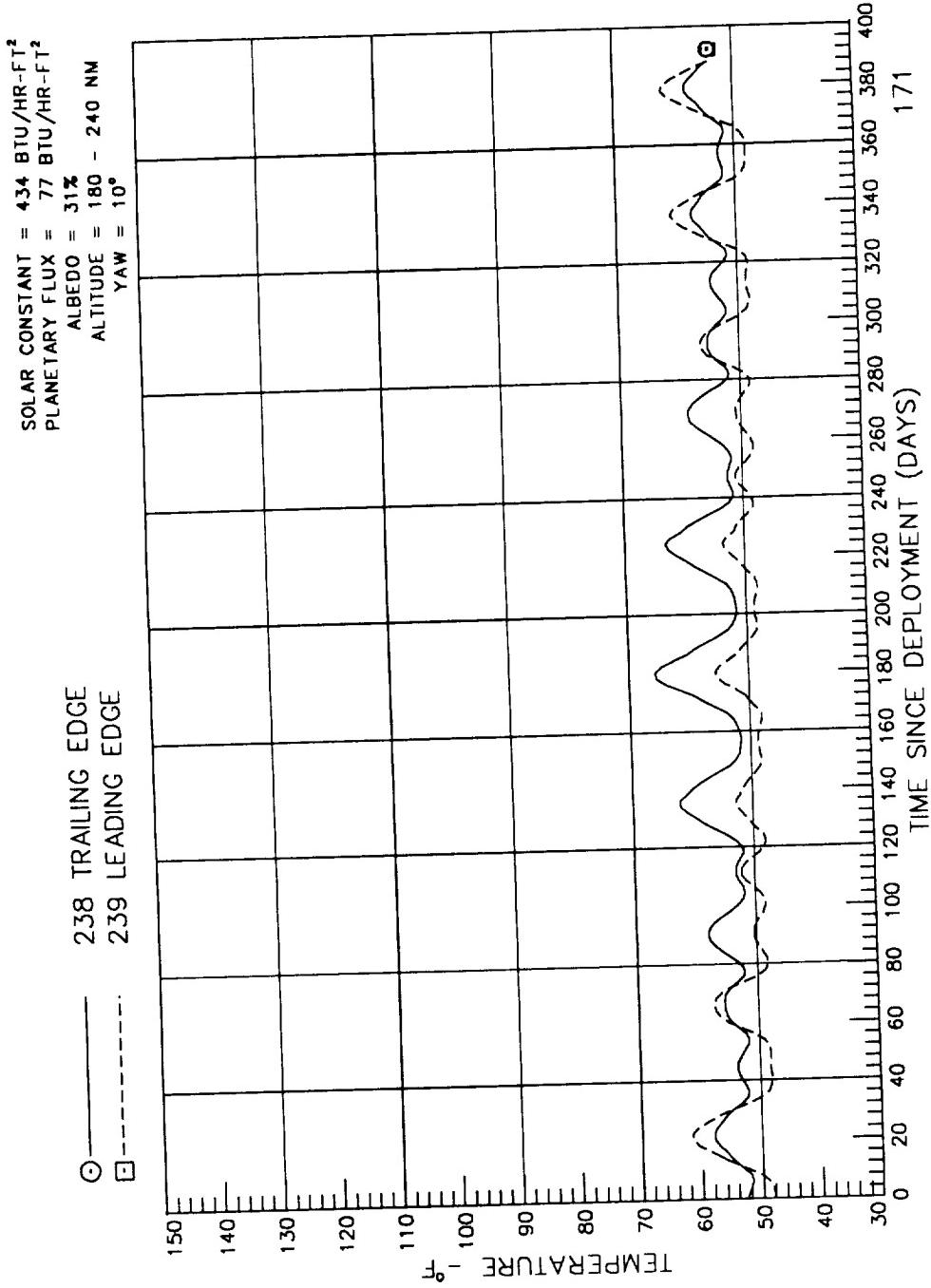
○ 236 A0139-A BATTERY



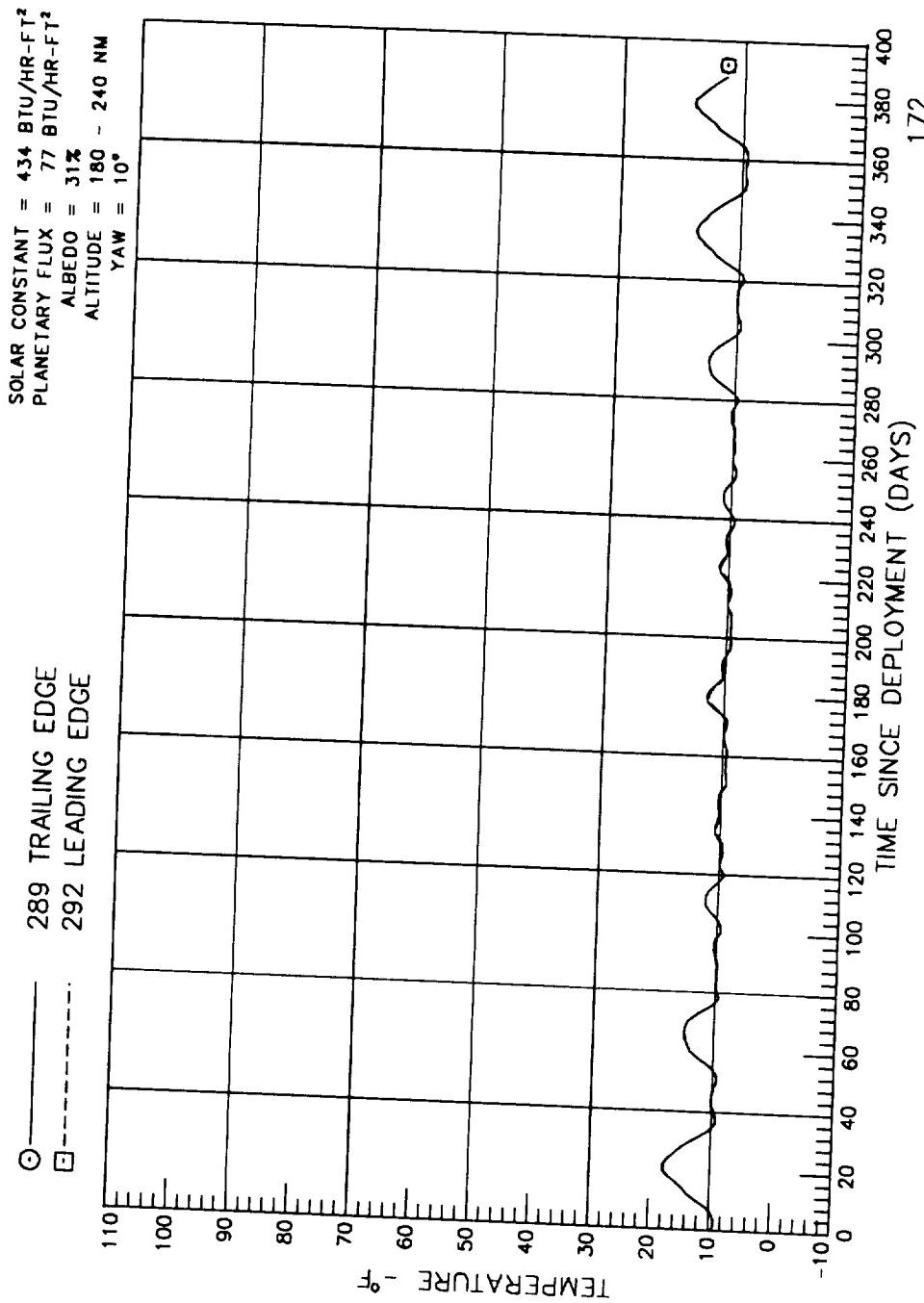
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 MAIN SCUFF PLATES



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 MAIN TRUNNION PINS



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 END SCUFF PLATES



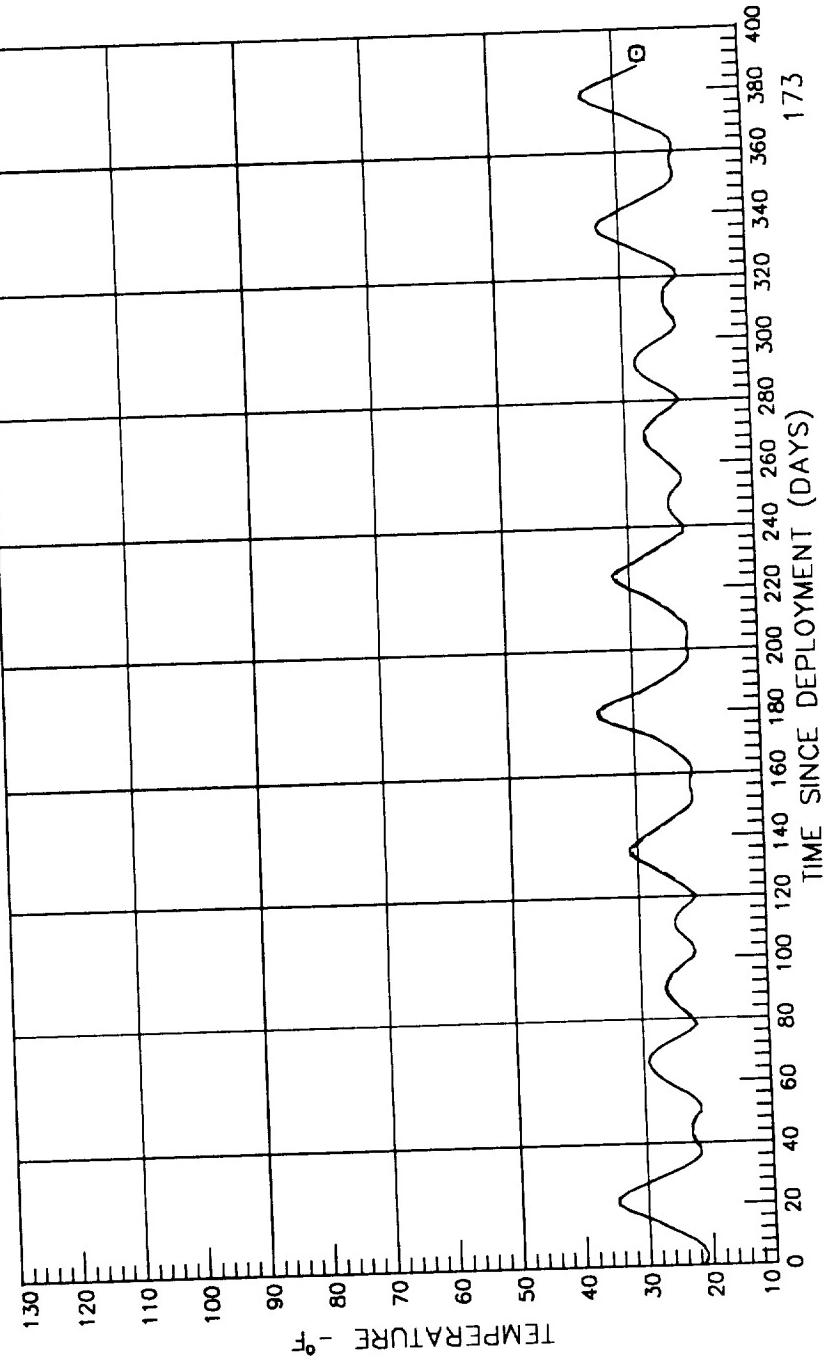
172

LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 END TRUNNION PIN

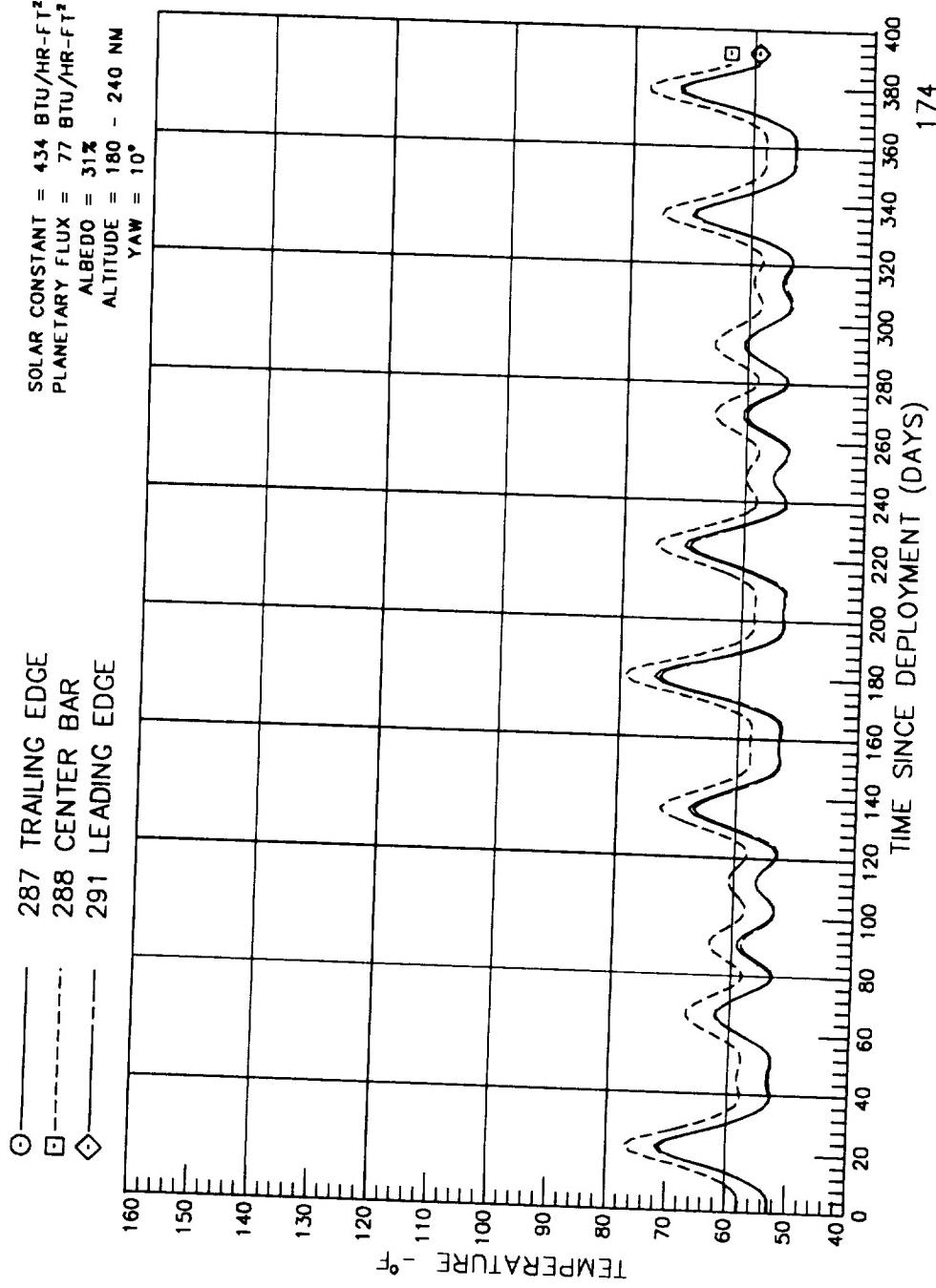
SOLAR CONSTANT = 434 BTU/HR-FT²
 PLANETARY FLUX = 77 BTU/HR-FT²

ALBEDO = 31%
 ALTITUDE = 180 - 240 NM
 YAW = 10°

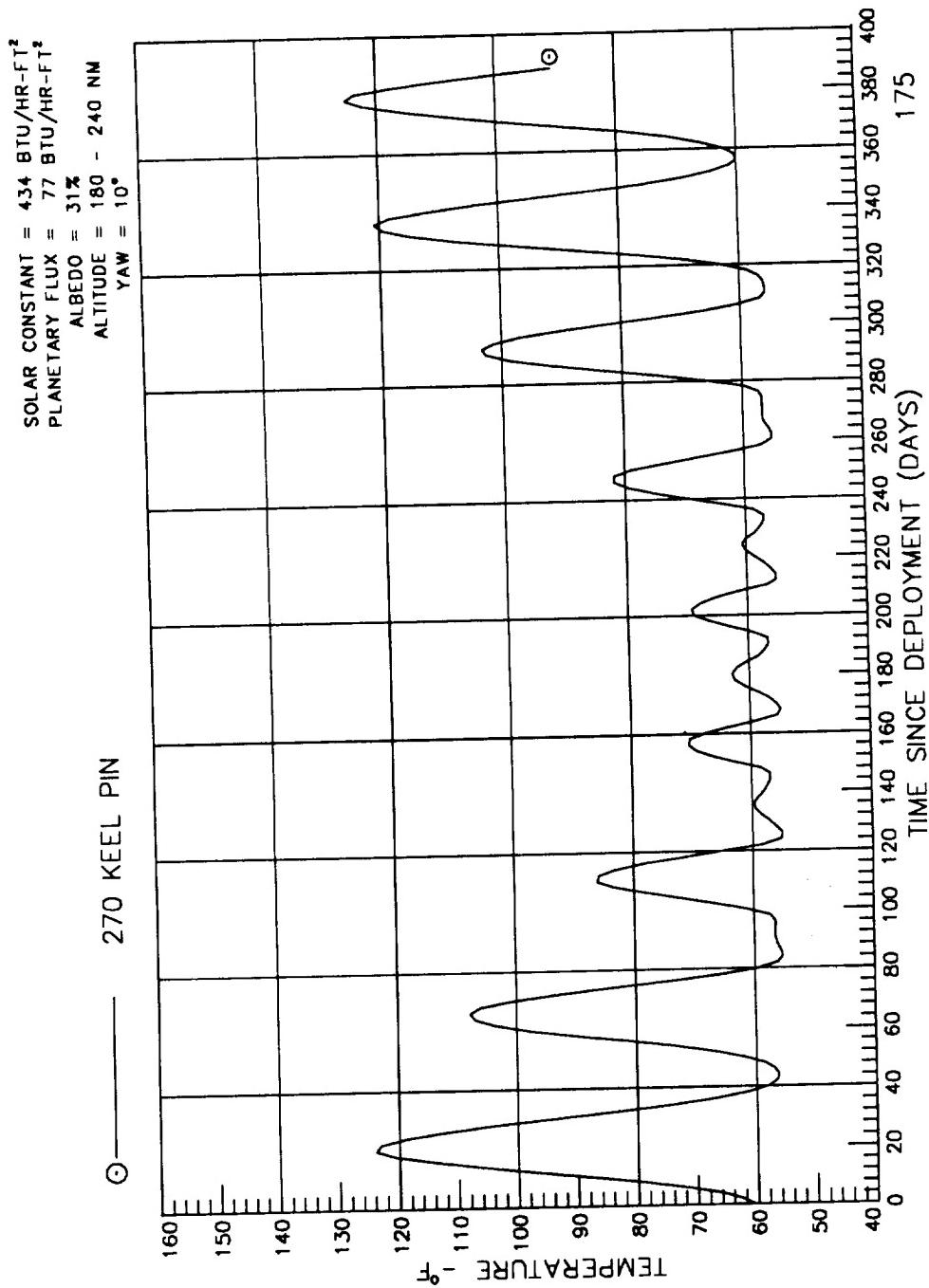
— 290 TRAILING EDGE
 - - - 293 LEADING EDGE



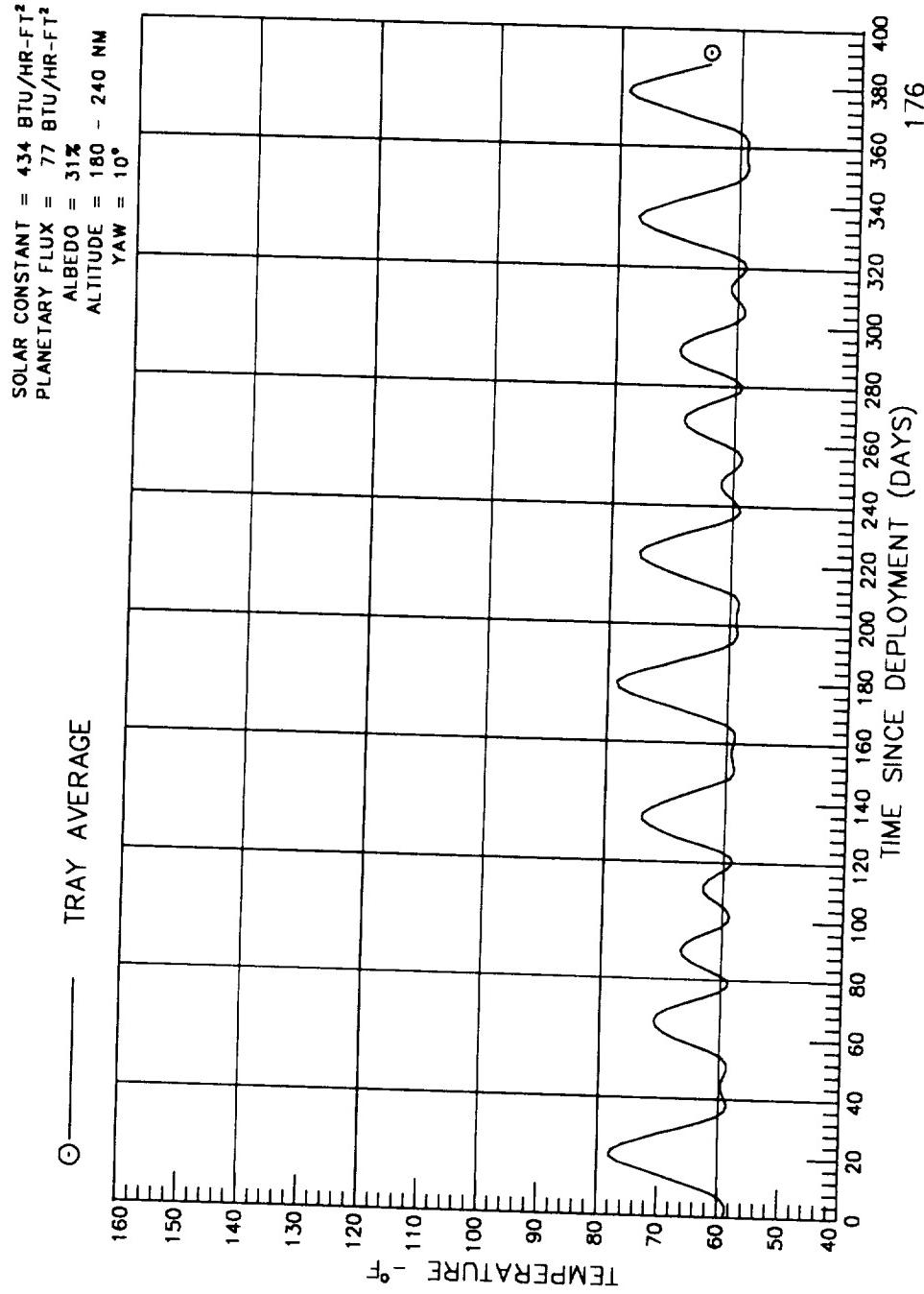
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 END SUPPORT BEAM



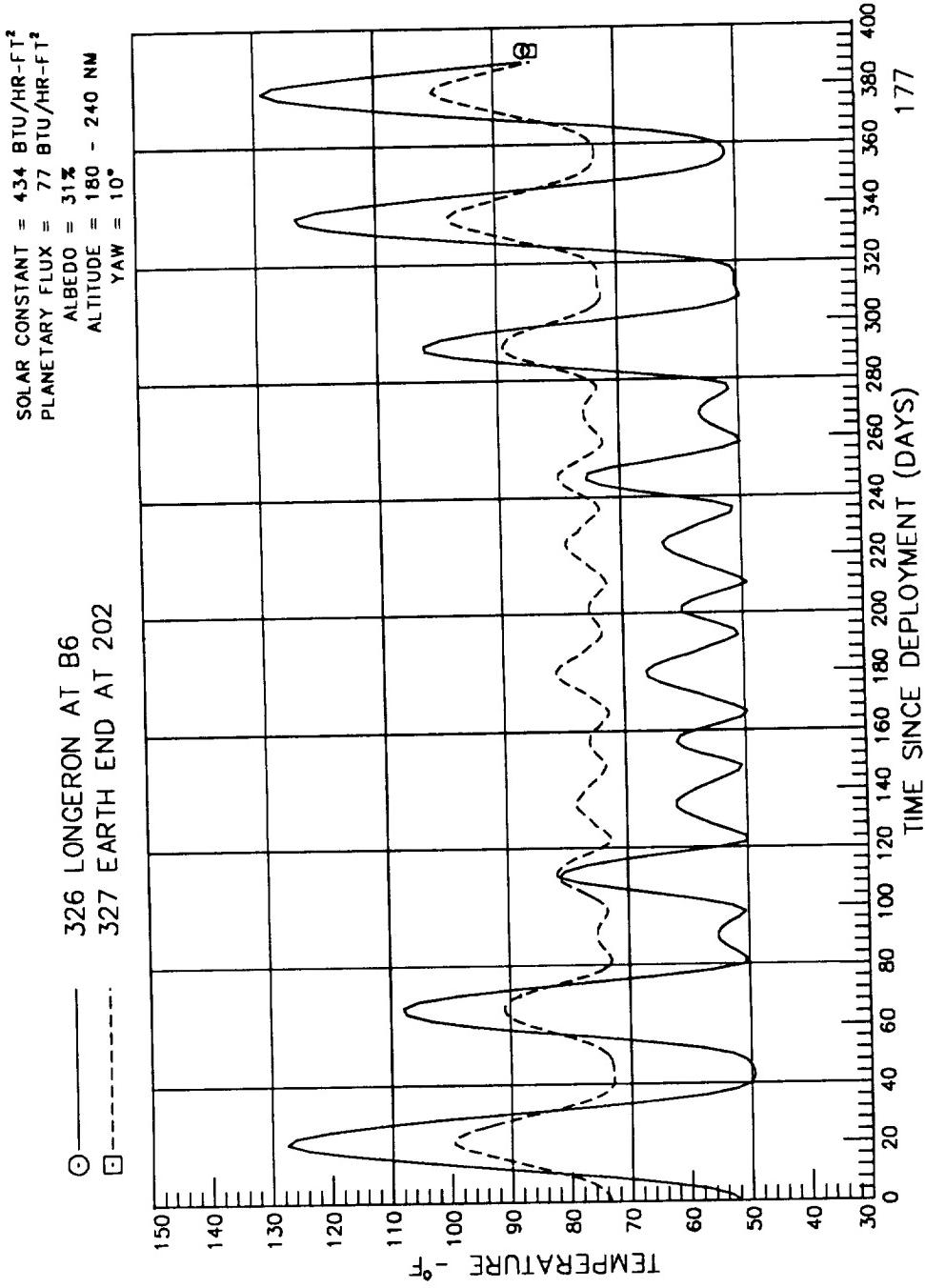
LONG DURATION EXPOSURE FACILITY
DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
KEEL



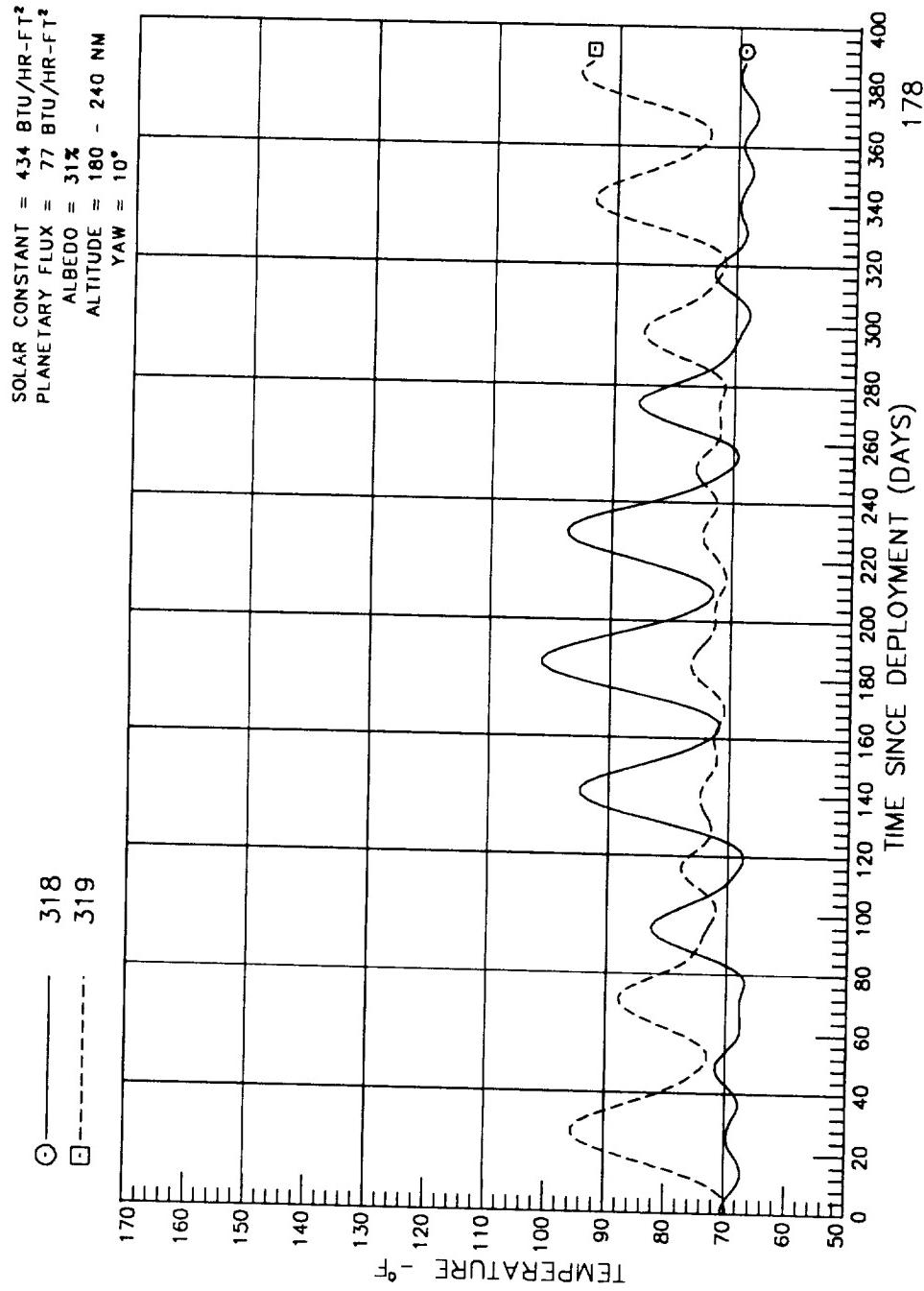
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 AVERAGE FOR TRAYS 1 - 72



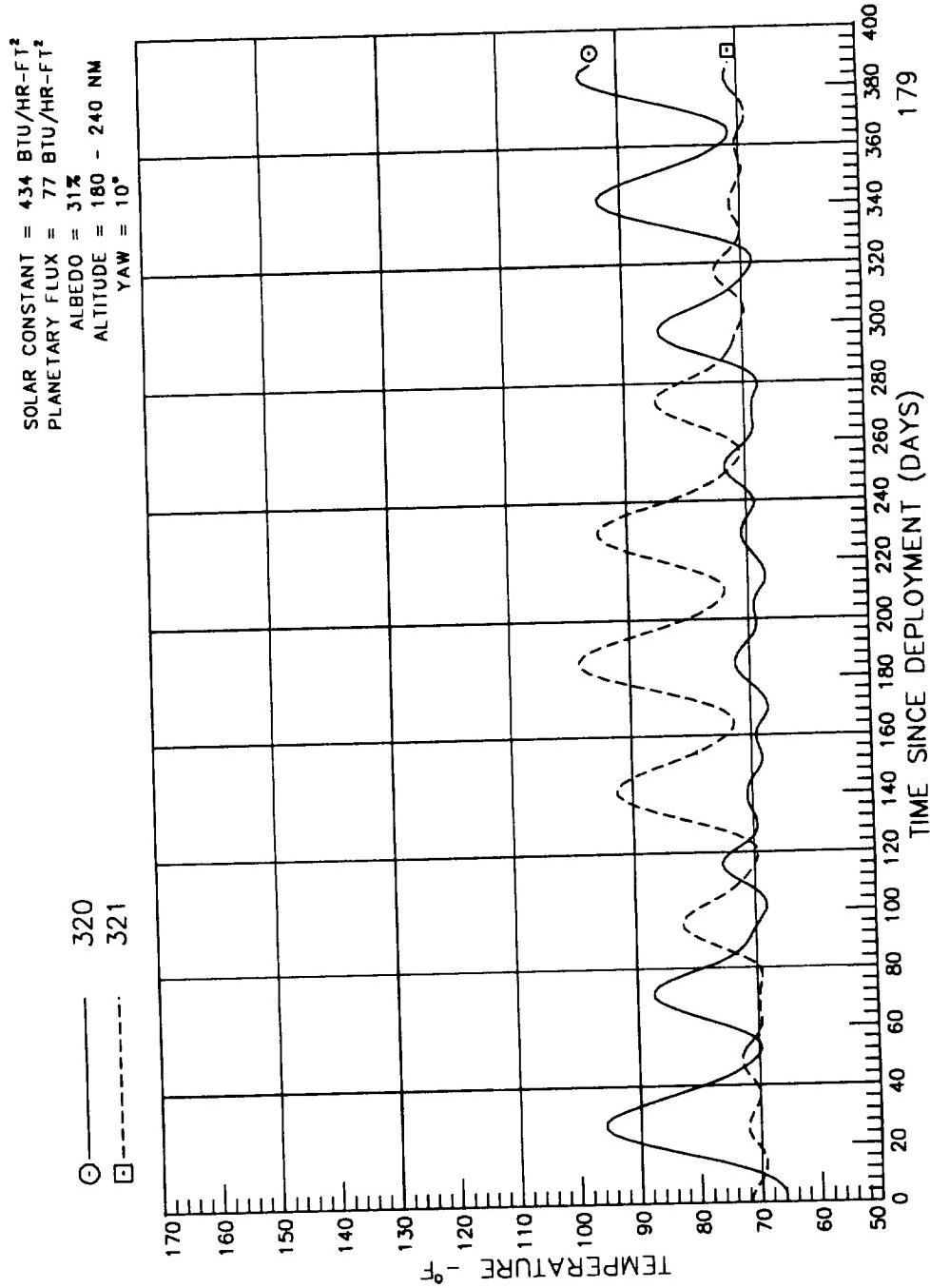
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 T/C NODES EE & LG 6-7



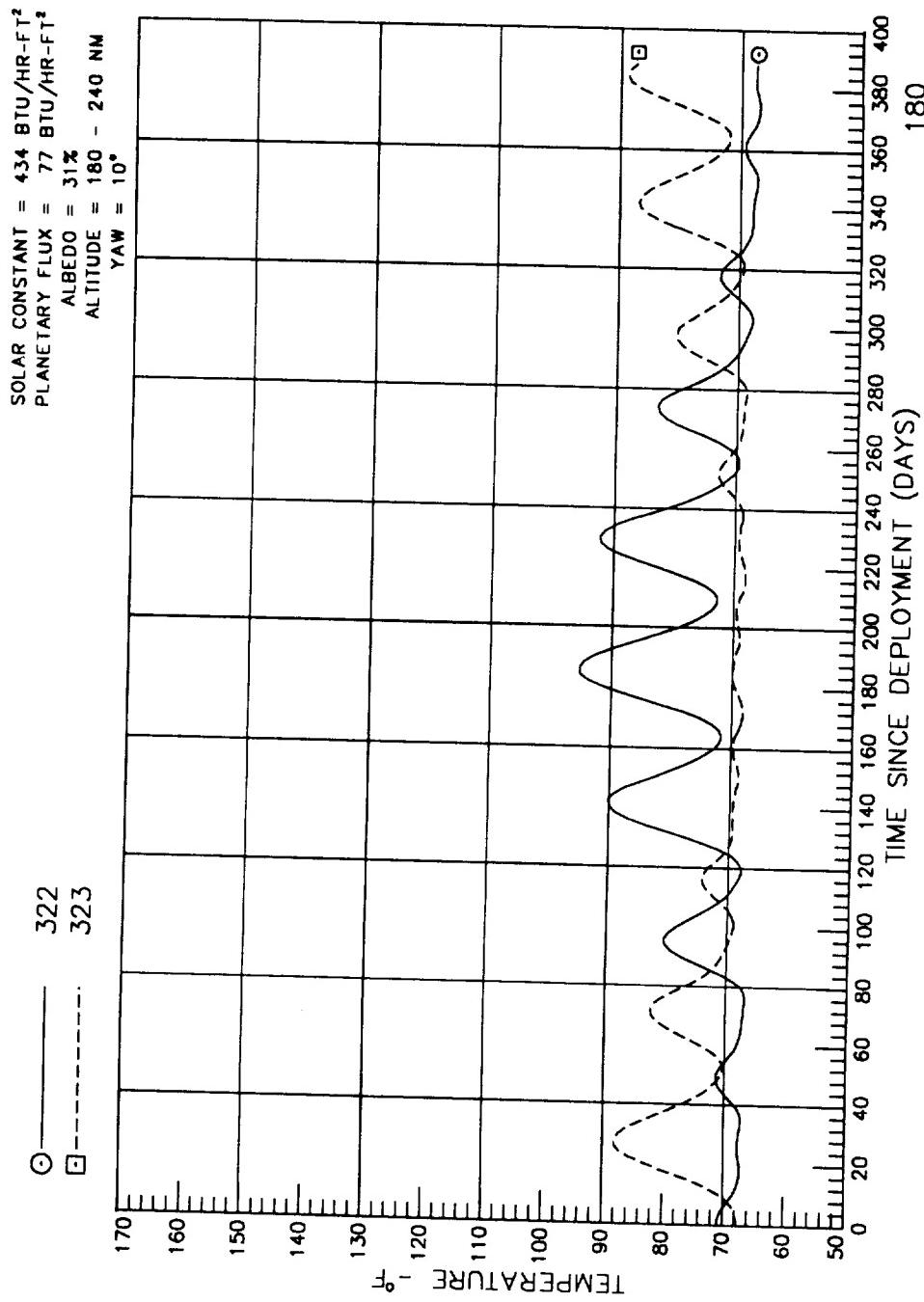
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 INTERIOR STRUTS



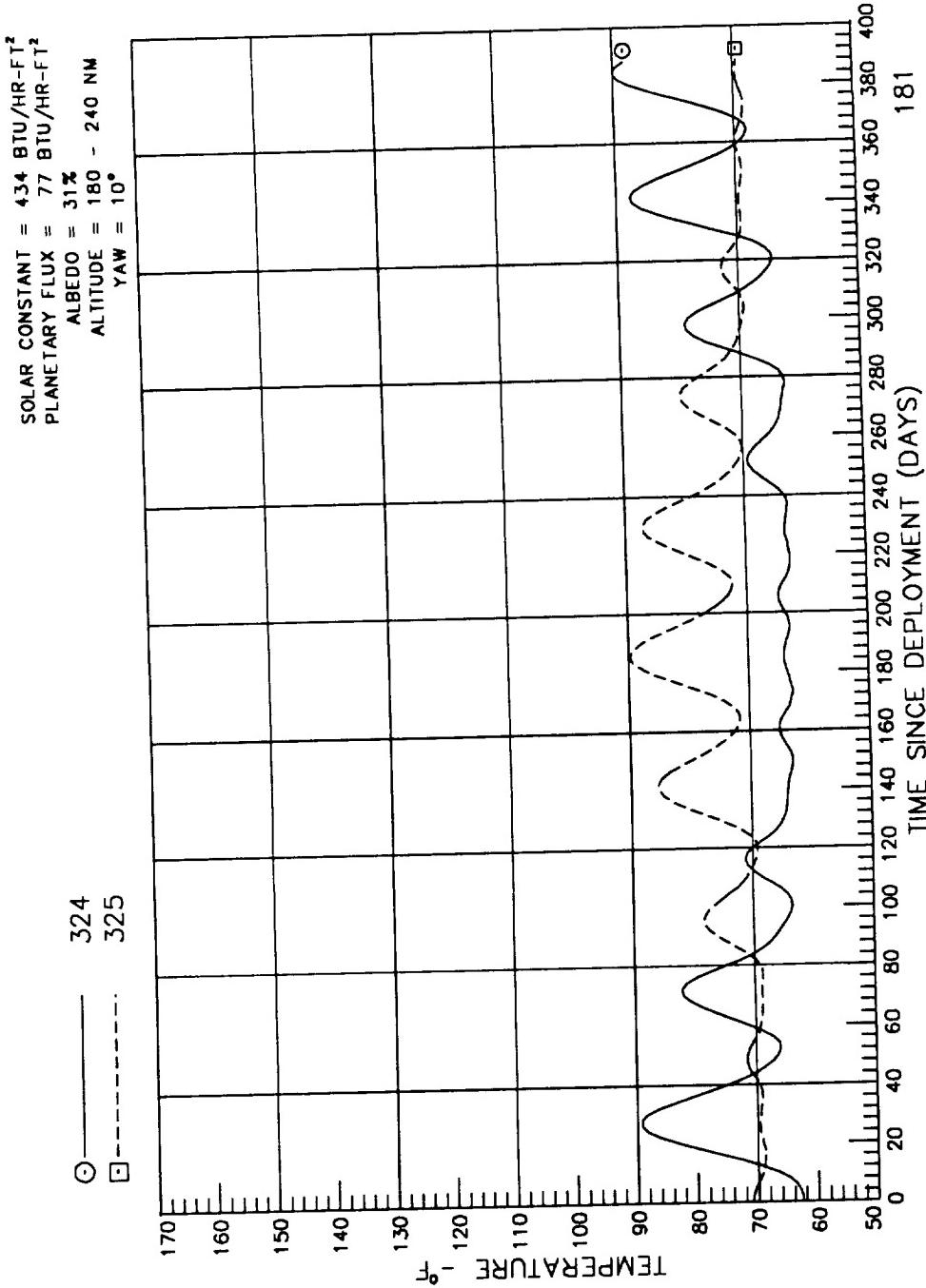
LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 INTERIOR STRUTS



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 INTERIOR STRUTS



LONG DURATION EXPOSURE FACILITY
 DAILY AVERAGE TEMPERATURE 12/20/88 - 1/12/90
 INTERIOR STRUTS



D - 181

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)			2. REPORT DATE January 1992	3. REPORT TYPE AND DATES COVERED Technical Memorandum
4. TITLE AND SUBTITLE Long-Duration Exposure Facility Post-Flight Thermal Analysis			5. FUNDING NUMBERS WU 506-43-21-14	
6. AUTHOR(S) William M. Berrios Thomas R. Sampair			8. PERFORMING ORGANIZATION REPORT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) NASA Langley Research Center Hampton, VA 23665-5225			10. SPONSORING / MONITORING AGENCY REPORT NUMBER NASA TM-104208, Part 1	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) National Aeronautics and Space Administration Washington, DC 20546-0001			11. SUPPLEMENTARY NOTES Berrios: Langley Research Center, Hampton, VA Sampair: Lockheed Engineering & Sciences Company, Hampton, VA Created in support of the Long Duration Exposure Facility Project Office for the estimation of temperatures during the 5-3/4 years mission.	
12a. DISTRIBUTION / AVAILABILITY STATEMENT Unclassified - Unlimited Subject Category 18			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This document presents results of the post-flight thermal analysis for the Long Duration Exposure Facility (LDEF) 5-3/4 years mission. The LDEF mission thermal analysis was verified by comparing the thermal model results to flight data from the LDEF Thermal Measurements System (THERM). Post-flight calculated temperatures uncertainties have been reduced to under $\pm 18^{\circ}\text{F}$ from the pre-flight uncertainties of $\pm 40^{\circ}\text{F}$. The THERM consisted of eight temperature sensors, a shared tape recorder, a standard LDEF flight battery, and an electronics control box. The temperatures were measured at selected locations on the LDEF structure interior during the first 390 days of flight and recorded for post-flight analysis. After the LDEF retrieval from Space on January 12, 1990, the tape recorder was recovered from the spacecraft and the data reduced for comparison to the LDEF predicted temperatures. The LDEF mission temperatures were calculated prior to the LDEF deployment on April 7, 1980, and updated after the LDEF retrieval with actual flight parameter data; including thermal fluxes, spacecraft attitudes, thermal coatings degradation, and contamination effects. All updated data used for the calculation of post-flight temperatures is also presented in this document.				
14. SUBJECT TERMS Thermal analysis, Long Duration Exposure Facility, post-flight thermal model, LDEF retrieval, thermal coatings degradation, flight data.			15. NUMBER OF PAGES 541	
17. SECURITY CLASSIFICATION OF REPORT Unclassified			18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified
20. LIMITATION OF ABSTRACT				

NSN 7540-01-280-5500

Standard Form 298 (Rev 2-89)
Prescribed by ANSI Std Z39-18
298-102